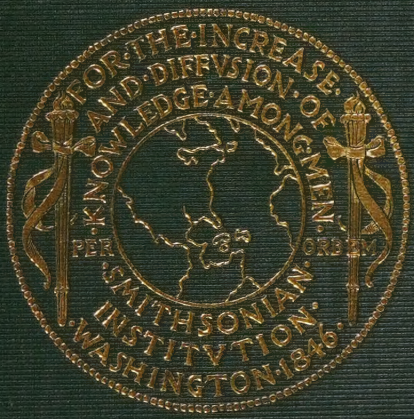
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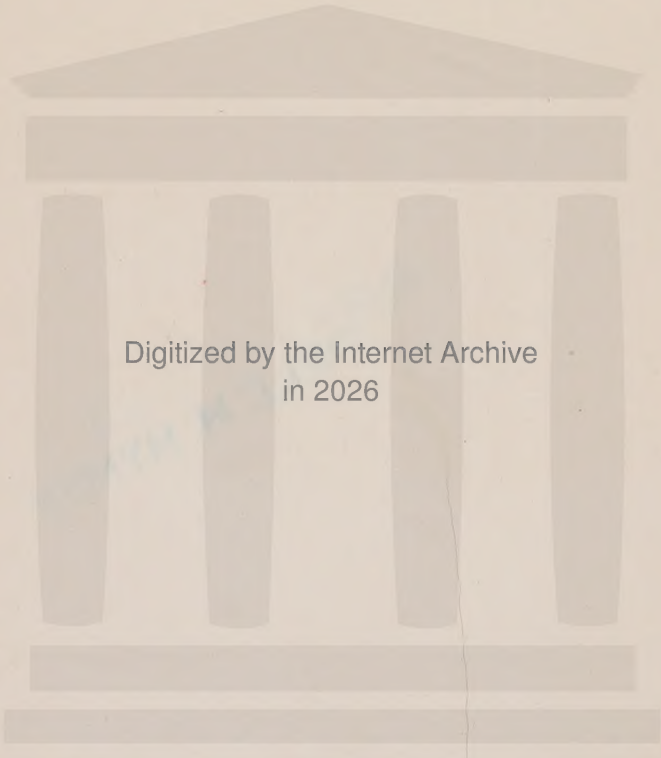
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ANNUAL REPORT

OF THE

BOARD OF REGENTS

OF THE

SMITHSONIAN INSTITUTION,

SHOWING

THE OPERATIONS, EXPENDITURES, AND CONDITION
OF THE INSTITUTION

FOR THE

YEAR ENDING JUNE 30, 1896.

REPORT

OF THE

U. S. NATIONAL MUSEUM.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1898.

AN ACT PROVIDING FOR THE PUBLIC PRINTING AND BINDING, AND THE DISTRIBUTION OF PUBLIC DOCUMENTS.

Approved January 12, 1895.

"Of the Report of the Smithsonian Institution, ten thousand copies; one thousand copies for the Senate, two thousand for the House, five thousand for distribution by the Smithsonian Institution, and two thousand for distribution by the National Museum."

REPORT

OF THE

U. S. NATIONAL MUSEUM,

UNDER THE DIRECTION OF

THE SMITHSONIAN INSTITUTION,

FOR THE

YEAR ENDING JUNE 30, 1896.

REPORT OF THE U. S. NATIONAL MUSEUM FOR THE YEAR ENDING JUNE 30, 1896.

SUBJECTS.

I. Report of the Assistant Secretary of the Smithsonian Institution, in charge of the National Museum, with Appendices.

II. Papers describing and illustrating collections in the U. S. National Museum.

UNITED STATES NATIONAL MUSEUM,
UNDER DIRECTION OF THE SMITHSONIAN INSTITUTION,
Washington, August 8, 1896.

SIR: I have the honor to submit herewith a report upon the present condition of the United States National Museum, and upon the work accomplished in its various departments during the fiscal year ending June 30, 1896.

Very respectfully,

G. BROWN GOODE,
Assistant Secretary, in charge of U. S. National Museum.

Mr. S. P. LANGLEY,
Secretary Smithsonian Institution.

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PART I.

REPORT

UPON THE

CONDITION AND PROGRESS OF THE U. S. NATIONAL MUSEUM DURING THE YEAR ENDING JUNE 30, 1896.

BY

G. BROWN GOODE,

ASSISTANT SECRETARY, SMITHSONIAN INSTITUTION, IN CHARGE OF U. S. NATIONAL MUSEUM.

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I.—GENERAL CONSIDERATIONS.

By act of Congress passed in 1846 the Smithsonian Institution became the only lawful place of deposit for "all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging to the United States." These collections have served as a nucleus for the National Museum of the United States. For many years this Museum was supported entirely at the expense of the Smithson fund, and a considerable portion of the collections is the property of the Institution through gift or purchase.

A "museum" has been defined by Professor Huxley as "a consultative library of objects." Not only is the National Museum such a consultative library, but it is an agency for the instruction of the people of the whole country. It keeps in mind the needs of those whose lives are not occupied in the study of science, as well as of the teacher and the skilled investigator. Its benefits are extended without cost or reserve to hundreds of thousands of visitors from all parts of the United States who enter its halls every year, and through the distribution of the duplicate specimens in the Museum, made up into sets and accurately named, to public institutions in all parts of the country.

A.—Origin and Development of the Museum.

The history of the origin and development of the Museum has been detailed in previous reports, and was made the special subject of a paper entitled "The Genesis of the National Museum."[1] For our pres-

[1] "The Genesis of the National Museum," Report of the Smithsonian Institution (U. S. National Museum), 1891, pp. 273–330.

ent purpose it will suffice to repeat a few of the most essential facts as there stated.

The formation of a national museum in the city of Washington was first undertaken by a society organized in 1840, called "The National Institution," and afterwards "The National Institute," which was for four years exceedingly prosperous and active. The nucleus for a national museum was gathered by this society in the Patent Office building in Washington, and public opinion was educated to consider the establishment of such an institution worthy of the attention of the Government of the United States. In 1846, having failed in securing the public recognition at which it aimed, the society became inactive, and eventually, in 1861, passed out of existence. In the meantime the Smithsonian Institution had been organized, but from 1844 until 1858, when the so called "National Cabinet of Curiosities" passed into the charge of the Smithsonian Institution, the term "National Museum" was not in use. From that time onward it was used, unofficially, to designate the collections in the Smithsonian building.

In January, 1847, the first Board of Regents of the Smithsonian Institution, after many weeks of consultation and deliberation over the plans for organization, unanimously voted the following resolution:

Resolved, That it is the intention of the act of Congress, and in accordance with the design of Mr. Smithson, as expressed in his will, that one of the principal modes of executing the act and the trust is the accumulation of collections of specimens and objects of natural history and of elegant art, and the gradual formation of a library of valuable works pertaining to all departments of human knowledge, to the end that a copious storehouse of materials of science, literature, and art may be provided, which shall excite and diffuse the love of learning among men, and shall assist the original investigations and efforts of those who may devote themselves to the pursuit of any branch of knowledge.[1]

After the "national cabinet" had been delivered to the Regents, annual appropriations were made by Congress for its maintenance. During the twenty-three years which followed, the collections were greatly increased and were made the basis of numerous important memoirs upon the natural history and ethnology of America. The public halls, with their arrangements for the exhibition of a portion of the collection, also received a due share of attention, and a certain amount of instruction and pleasure was afforded to visitors. The appropriations, however, were meager, the space limited, and the staff was so inadequate that little could be done except to keep the collections in good preservation.

The broad plan upon which the operations of the National Museum are now conducted was anticipated as early as 1853, when Professor Henry wrote:

There can be little doubt that in due time ample provision will be made for a library and museum at the capital of this Union worthy of a Government whose perpetuity depends upon the virtue and intelligence of the people.[2]

[1] Report of committee on organization, p. 20.

[2] Report of the Smithsonian Institution, 1853, p. 245.

The difficulties attending the formation of such a museum were appreciated by him, and in his report for 1849 he spoke with much emphasis of the difficulties attending the assumption by the Institution of the care of the national collections, and in the Report of the Institution for 1870[1] he again carefully expressed his opinion as to the aims proper to such a museum.

"There is [he wrote] scarcely any subject connected with science and education to which more attention is given at the present day than that of collections of objects of nature and art known under the general denominations of museums. This arises from their growing importance as aids to scientific investigation and instruction."

In the Report for 1873[2] allusion was made to the increase in the national collections, even then very great, "requiring the utmost exertions of the limited force connected with the National Museum for its proper treatment."

Although the appropriations for the Museum have of late years been more liberal, it is certain that, on account of the immense annual increase in the quantity of material received, quite as much caution as ever is needed in the development of its plans for the future.

The Smithsonian Institution, from its foundation, fostered explorations, and its museum was enriched by the numerous ethnological and natural history objects brought home by the explorers. Many gifts were received from private sources, and valuable objects were deposited in its museum for safe-keeping. The nucleus of its collections was a small but valuable cabinet of minerals formed by the founder, James Smithson, who was himself a chemist and mineralogist of high repute, and a Fellow of the Royal Society of London.

At the time of the establishment of the Institution several naval expeditions and surveys of the public domain were being organized by the Government, and during their progress large collections of ethnological and natural history objects were made. Important foreign material was obtained by the Pacific Exploring Expedition, Perry's Expedition to Japan, and other naval expeditions, while the naturalists attached to the Pacific Railroad Survey, the Mexican Boundary Survey, and the surveys under the Army Engineer Corps brought together great collections illustrating the natural resources and ethnology of North America.

A new source of growth, subsequent to 1871, was the exploration of the waters of North America by the United States Fish Commission. The great collections of all forms of aquatic life made by the Commission found their way gradually into the National Museum, to be placed beside the collections of other bureaus of the Government engaged in scientific work.

At the close of the Centennial Exhibition of 1876 the exhibits of the United States Government and those of numerous foreign governments and of private exhibitors came to the National Museum.

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[1] Page 31. [2] Page 48.

A new period now began. The storage rooms and exhibition halls of the Smithsonian building were already overflowing with the accumulations of thirty years, and the small number of persons employed in caring for them were overburdened and unable properly to perform the requisite work. The limits of the collections had become wider, and a new and broader classification was found to be necessary. The growth of the country in wealth and culture had led to the establishment of many local museums, and the educational influences flowing from these and from the Centennial Exhibition caused a demand for more efficient methods of museum administration. The exhibition of 1876 had been indeed an event of great educational importance to the people of the United States; and not the least of its good works was the lesson it taught as to the possibilities for good in public museums.

The objects which at the close of the Centennial Exhibition were given to the United States for its National Musem were of large intrinsic value, and were also very important from the fact that the necessity of caring for them led to the erection of a large building for the expansion of the Museum itself.

In the early years Professor Baird, then assistant secretary of the Institution, with two or three assistants, had been able to give all necessary attention to the care of the collections, and the Museum had never been formally divided into departments. When the reorganization was made in 1881, under the immediate care of the present assistant secretary, the diversity of the collections made it necessary to establish a number of departments, each of which was placed in charge of a curator.

There are now twenty-eight organized departments and sections in the Museum, the larger number of which are in charge of specialists who receive no salary from the Museum. There are also seven administrative offices.

SPECIAL EPOCHS IN THE HISTORY OF THE MUSEUM.

The history of the National Museum may be divided into three periods:

First, the period from the foundation of the Smithsonian Institution to 1857, during which time specimens were collected solely to serve as materials for research. No special effort was made to exhibit them to the public or to utilize them, except as a foundation for scientific description and theory.

Second, the period from 1857, when the Institution assumed the custody of the "National Cabinet of Curiosities," to 1876. During this period the Museum became a place of deposit for scientific collections which had already been studied, these collections, so far as convenient, being exhibited to the public and, so far as practicable, made to serve an educational purpose.

Third, the present period (beginning in the year 1876), in which the

Museum has undertaken more fully the additional task of gathering collections and exhibiting them on account of their value from an educational standpoint.

During the first period the main object of the Museum was scientific research; in the second, the establishment became a museum of record as well as of research; while in the third period has been added the idea of public education. The three ideas—record, research, and education—cooperative and mutually helpful as they are, are essential to the development of every great museum. The National Museum endeavors to promote them all.

It is *a museum of record*, in which are preserved the material foundations of an enormous amount of scientific knowledge—the types of numerous past investigations. This is especially the case with those materials that have served as a foundation for the reports upon the resources of the United States.

It is *a museum of research*, which aims to make its contents serve in the highest degree as a stimulus to inquiry and a foundation for scientific investigation. Research is necessary in order to identify and group the objects in the most philosophical and instructive relations, and its officers are therefore selected for their ability as investigators as well as for their trustworthiness as custodians.

It is *an educational museum*, through its policy of illustrating by specimens every kind of natural object and every manifestation of human thought and activity, of displaying descriptive labels adapted to the popular mind, and of distributing its publications and its named series of duplicates.

In conclusion let us review what seems to have been definitely accomplished since the time of reorganization in 1881.

The definite steps of progress may be summarized as follows:

(1) An organization of the Museum staff has been effected, efficient for present purposes and capable of expansion and extension as occasion may require, and many capable museum experts have been trained for work in other institutions.

(2) Through the agency of the staff the materials in the Museum, the accumulations of nearly half a century, have been examined, classified, and brought under control and arranged in such manner as to insure their sefety and make them available for study.

(3) The collections have been increased eighteenfold.

(4) A considerable beginning has been made toward the development of a well-labeled and effectually installed exhibition series, available for the instruction of the public.

(5) A thorough study of the organization and systems of classification in other museums throughout the world has been made, the results of which are beginning to appear in the work of the Museum staff and which will be made available for other institutions from time to time through the publications of the Museum.

(6) Many new methods of installation have been developed by experiment in the Museum, and the best and most available employed elsewhere have been adopted. Our new methods are being applied in many similar establishments at home and abroad.

(7) The art of taxidermy and the making of museum models has been advanced and dignified by the policy adopted in the treatment of the experts in the employ of the Museum.

(8) Science has been forwarded by the publication of some thousands of papers describing the materials in the Museum, while the work of specialists in the production of these papers has greatly enhanced the value of the national collections.

(9) Popular educational work of unquestioned value has been accomplished by participation in the great expositions in Philadelphia, Berlin, London, New Orleans, Cincinnati, Louisville, Madrid, and Chicago.

(10) Hundreds of thousands of named specimens have been distributed to other museums and to colleges and schools.

EXPECTATIONS OF FUTURE DEVELOPMENT.

That the United States must have a National Museum worthy of the dignity of the nation is self-evident.

Every country has a museum or group of museums in its capital city—centers of scientific and educational activity—the treasure-house of the people, filled with memorials of national triumphs in the fields of science, art, and industrial progress.[1]

These are legitimate objects of national pride, for upon the character of its museums and libraries, intelligent persons, visiting a country, very properly base their judgment as to the nature and degree of the civilization of the people.

Washington may without question be made the seat of one of the greatest museums in the world. It may perhaps be neither practicable nor desirable to gather together in this city extensive collections of ancient mediæval art, but a representative series of such objects will undoubtedly grow up which will tend to educate the public taste, promote the study of the elements of art and the history of civilization, and forward the arts of design. This having been accomplished, attention should be directed mainly toward the exhibition of the geology and natural history of America and its natural resources, to the preservation of memorials of its aboriginal inhabitants, and the encouragement of the arts and industries of our own people.

It is evident that the National Museum of the United States will of necessity have features peculiar to itself, developed in response to the peculiar needs of the people of this continent. It should be remembered that the national collections of every principal European nation are divided into several groups, each under separate administration,

[1] Most of the older nations have museums devoted to their military achievements and triumphs, but our country has no need or desire to enter into this field of work.

though often within the general control of some central authority. In France, for instance, most of the museums are under the Ministry of Public Instruction, and in England, to a less extent, under the Department of Science and Art.

In the great capitals of Europe the public collections are scattered through various parts of the same city, in museums with distinctive names and independent in their organizations. Much of the work which should properly be done by such museums is omitted, because no one of them has seen fit to undertake it; while, on the other hand, much labor is duplicated, which is perhaps equally unfortunate—collections of similar scope and purpose being maintained in different parts of the same city. One of the chief objections to such division of effort is that much of the value of large collections in any department is lost by failure to concentrate them where they may be studied and compared side by side. In Washington the national collections are all, without exception, concentrated in one group of buildings. The Army Medical Museum now occupies a building side by side with those under the control of the Smithsonian Institution, and this proximity, in connection with the long-established policy of cooperation between the two organizations, renders them, for all practical purposes, united in interest.

Although the appropriations from the public treasury for the maintenance of the National Museum are small compared with those in several European countries, the value of objects given by private individuals is proportionately large. The actual value of such contributions for ten years past has not, it is estimated, fallen short of $20,000 a year, and in some years it has been greater.

Among important gifts may be mentioned the George Catlin Indian gallery, of inestimable value to the American historian and ethnologist; the collection of North American insects, given by Prof. C. V. Riley; the collection bequeathed in 1887 by the late Dr. Isaac Lea, of Philadelphia, containing, besides minerals and other objects, about 20,000 conchological specimens, and appraised by the State at $10,000; the collections of mollusks, gems, and precious stones presented by the Rev. L. T. Chamberlain and Mrs. Frances Lea Chamberlain; the large and valuable collections of African mammals, birds, etc., made and presented by Dr. W. L. Abbott and Mr. William Astor Chanler; the Bendire and Ralph collections of American birds' eggs, given to the Smithsonian Institution; the Lacoe collection of fossil plants, and the collection of the American Institute of Mining Engineers, for the transfer of which from Philadelphia to Washington a special appropriation was made by Congress.

Some exceedingly valuable collections in this country and in Europe have been bequeathed to the Smithsonian Institution, which have not yet come into its possession. It is estimated that within the past fifteen years individuals to the number of more than 2,000 have made gifts to the Museum to the value of $100 each, or more.

The National Museum now contains more than three and a half millions of objects.

The intrinsic value of such collections as these can not well be expressed in figures. There are single specimens worth hundreds, others worth thousands of dollars, and still others which are unique and priceless. Many series of specimens, which owe their value to their completeness and to the labor which has been expended on them, can not be replaced at any price. The collections at a forced sale would realize more than has been expended on them, and a fair appraisal of their value would amount to several millions of dollars.

One of the most striking features in the affairs of the Museum is the manner in which its collections are increasing. In 1896 the number of specimens is more than eighteen times as great as in 1882.

In the direct purchase of specimens but little money has been spent, less perhaps in fifty years than either France, England, Germany, or Austria expends in a single year on similar objects. The entire Museum is the outgrowth of Government expeditions and expositions, and of gifts prompted largely by the generosity of the American people.

As might be supposed, a considerable proportion of the objects given are duplicates of material already on hand, and although these contributions can, with the utmost advantage, be used for distribution to museums and schools, they do not materially increase the value of the collections for study by specialists and for general educational purposes.

The need of a larger fund for the purchase of specimens is yearly becoming more manifest. Exceedingly important material is constantly offered at prices very much below what it would cost to obtain it by collecting, and in many instances, when refused, it is eagerly taken by the museums and institutions of Europe.

The Museum in its present condition may be compared to a book from which pages here and there have been omitted, so that the narrative is disjointed and incomplete.

The museums of England are rich with the accumulations of centuries. The National Museum of the United States is young, and has enormous deficiencies in every department. It needs, more than any museum in Europe, the opportunity to increase its resources through purchase. The total amount expended for the purchase of specimens for the National Museum since 1891 has averaged less than $7,000 a year.

For the purchase of specimens for the South Kensington Museum, from 1853 to 1887, $1,586,634 was expended, or a yearly average of nearly $47,000.

Toward her other museums England is equally liberal. Exact statistics are not at hand, but it is quite within bounds to assert that her average expenditures for the purchase of new objects for museums in London is not less than $500,000 a year.

Our Museum is the result of the activities of an enlightened Government. Through a thousand channels materials for the formation of a museum come into the possession of the Government, and out of such materials our Museum has been built. A museum formed in this manner, however, suffers sooner or later from immense accumulations of objects of certain kinds and from the absence of others. This is true of the National Museum. At the outset no additions were unwelcome, and the expectation that all important deficiencies would be supplied might properly be indulged in. As the years have passed, however, it has become more and more apparent that many of these deficiencies can only be supplied by purchase.

More striking present results might certainly have been attained by limiting the developments of the Museum to special fields. We have, however, had in view the future as well as the present, and no object has been refused a place in the Museum which is likely to be needed, even in the remote future, in the development of whatever grand museum plans the nation may ultimately be willing to promote.

B.—Organization and Scope of the Museum.

The National Museum is under the charge of the Smithsonian Institution, and its operations are supervised by the Board of Regents of the Institution.

The Secretary of the Smithsonian Institution is by law the "keeper of the Smithsonian Museum," and the assistant secretary, by the usage of nearly fifty years, its executive head.

In the act of Congress passed in 1846, to establish the Smithsonian Institution, are contained the following provisions concerning the scope of the museum to be placed under its charge:

1. The act above referred to provides that "all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging, or hereafter to belong, to the United States, which may be in the city of Washington," shall be delivered to the Regents of the Smithsonian Institution, and, together with new specimens obtained by exchange, donation, or otherwise, shall be so arranged and classified as best to facilitate examination and study.

2. It provides that, in proportion as suitable arrangements can be made for their reception, these objects shall be delivered to such persons as may be authorized by the Board of Regents to receive them.

3. It provides that they shall be arranged in such order and so classified as best to facilitate their examination and study.

4. It provides that they shall thus be arranged in the building to be erected for the Institution.

5. It authorizes the Regents to obtain new specimens, by exchange of duplicate specimens and by gift, and directs also that they shall be appropriately classified and arranged.

The National Museum thus became the authorized place of deposit for all objects of art, archæology, ethnology, natural history, miner-

alogy, geology, etc., belonging to the United States or collected by any agency whatsoever for the Government of the United States, when no longer needed for investigations in progress.

The collections in the Museum are intended to exhibit the natural and industrial resources, primarily of the United States and secondarily of other parts of the world, for purposes of comparison.

The activities of the Museum are exerted especially in three directions:

1. The permanent preservation of the collections already in its possession, which depends chiefly upon the vigilance of the curators and the skill of the preparators.

2. The increase of the collections, which are acquired—

(1) From the various Government surveys and expeditions, in accordance with law;

(2) By gift from individuals, from other institutions, and from foreign governments;

(3) By exchange for its duplicate specimens or for publications;

(4) By the efforts of officers of the Museum, who make collections in connection with their regular duties, or are detailed for special service of this nature;

(5) By purchase, when appropriations are made by Congress for that purpose.

3. The utilization of the collections, which is effected by exhibiting them to the public, and by encouraging investigations on the part of the officers of the Museum and other suitable persons, and facilitating the publication of the results; also by the distribution to other museums and educational institutions of duplicate specimens, which have formed the basis of scientific investigation, these being identified and labeled by the best authorities.

The collections of the National Museum are made up to a very large extent of the following materials:

1. The natural history and anthropological collections accumulated since 1850 by the efforts of the officers and correspondents of the Smithsonian Institution.

2. Collections which have resulted from explorations carried on more or less directly under the auspices of the Smithsonian Institution, or resulting from explorations carried on by the Smithsonian Institution in connection with educational institutions or commercial establishments.

3. Collections which have been obtained through the courtesy of the Department of State and the cooperation of United States ministers and consuls.

4. The collection of the Wilkes Exploring Expedition, the Perry Expedition to Japan, and other naval expeditions.

5. Collections made by the scientific officers of Government surveys, such as the Pacific Railroad Survey, the Mexican Boundary Survey, and the surveys carried on by the Engineer Corps of the United States Army and by officers of the Signal Corps of the United States Army stationed in remote regions.

6. Collections obtained by the United States Geological Survey, the United States Fish Commission, and those resulting from the activities of the United States Department of Agriculture and other Departments of the Government.

7. The remnant of the collections of the old "National Institute."

8. The collections made by the United States to illustrate the animal and mineral resources, the fisheries, and the ethnology of the native races of the country on the occasion of the Centennial Exhibition at Philadelphia in 1876; the fishery collections displayed by the United States at the International Fisheries Exhibition at Berlin in 1880 and at London in 1883, and the collections obtained from various local expositions, as, for instance, the New Orleans Cotton Centennial Exposition in 1884 and 1885, the Cincinnati Exposition in 1887, and the World's Columbian Exposition in 1893.

9. The collections given by the Governments of the several foreign nations, thirty in number, which participated in the exhibition at Philadelphia in 1876.

10. The industrial collections given by numerous manufacturing and commercial houses of Europe and America at the time of the Philadelphia Exhibition and subsequently.

11. The materials received from museums in Europe and America in exchange for duplicate specimens.

12. Collections received as gifts, deposits, or in exchange from individuals, numbering usually from 1,000 to 1,500 each year.

The publications of the Museum consist of—

1. The Annual Report.
2. The Proceedings of the National Museum.
3. The Bulletin of the National Museum.
4. The series of circulars.

Papers by members of the Museum staff, based upon the collections, have been printed in every scientific periodical in the United States and in many of those of Europe.

RELATIONS OF THE MUSEUM TO THE SMITHSONIAN INSTITUTION.

The Smithsonian Institution, although it bears the name of a foreigner, has for half a century been one of the most important agencies in the intellectual life of our people. It has been a rallying point for the workers in every department of scientific and educational work and the chief agency for the free exchange of books, apparatus of research, and of scientific intelligence between this and other countries. Its publications, which include more than two hundred volumes, are to be found in all the important libraries in the world, and some of them, it is safe to say, on the work-table of every scientific investigator. Its great library constitutes an integral and very important part of the national collection at the Capitol, and its museum is the richest in existence in many branches of the natural history and ethnology of the New World. Many wise and enlightened scholars have given their best years to its service, and some of the most eminent men of science to whom our country has given birth have passed their entire lifetime in working for its success.

Through these books, through the reputation of the men who have worked for it and through it, and through the good accomplished by its system of international exchange, by means of which within the past forty-four years about one and a half million packages of books

and other scientific and literary materials have been distributed to every region of the earth, it has acquired a reputation at least as far-reaching as that of any other institution of learning in the world.

It is therefore representative of what is deemed in other lands the chief glory of this nation, for whatever may be thought in other countries of American art and literature, or of American institutions generally, the science of America is everywhere accepted as sound, vigorous, and progressive.

In the scientific journals of Great Britain and other European countries the reader finds most appreciative reviews of the scientific publications of the Smithsonian, the Museum, the Bureau of Ethnology, the Geological Survey, the Department of Agriculture, and the Fish Commission, and they are constantly holding up the Government of the United States as an example of what governments should do for the support of their scientific institutions.

It is surely a legitimate source of pride to Americans that their work in science should be so thoroughly appreciated by other nations, and it is important that the reputation should be maintained. Nothing can be more in consonance with the spirit of our Government, or more in accord with the injunction of Washington in his Farewell Address, admiringly quoted by Sir Lyon Playfair in his address as president of the British Association for the Advancement of Science:

Promote, then, as an object of primary importance, institutions for the general diffusion of knowledge.

In proportion as the structure of a government gives force to public opinion, it should be enlightened.

No one has yet explained, except by conjecture, why James Smithson selected the United States as the seat of his foundation. He had no acquaintances in America, nor does he appear to have had any books relating to America, except two. Rhees quotes from one of these ("Travels through North America," by Isaac Weld, secretary of the Royal Society) a paragraph concerning Washington, then a small town of 5,000 inhabitants, in which it is predicted that "the Federal city, as soon as navigation is perfected, will increase most rapidly," and that, at a future day, if the affairs of the United States go on as prosperously as they have done, it will become the grand emporium of the West and rival in magnitude and splendor the cities of the Old World.

Inspired by a belief in the future greatness of the new nation, realizing that while the needs of England were well met by existing organizations, such as would not be likely to spring up for many years in a new, poor, and growing country, he founded in the new England an institution of learning, the civilizing power of which has been of incalculable value. Who can attempt to say what the condition of the United States would have been to-day without this bequest?

Well did President John Quincy Adams say:

Of all the foundations of establishments for pious or charitable uses

which ever signalized the spirit of the age or the comprehensive beneficence of the founder, none can be named more deserving the approbation of mankind.

The most important service by far which the Smithsonian Institution has rendered to the nation has been that extended from year to year since 1846—intangible but none the less appreciable—by its constant cooperation with the Government, public institutions, and individuals in every enterprise, scientific or educational, which needed advice, support, or aid from manifold resources.

There have been, however, material results of its activities, the extent of which can not fail to impress anyone who will look at them. The most important of these are the library and the Museum, which have grown up under its fostering care.

THE LIBRARY.

The library has been accumulated without aid from the Treasury of the United States. It has, in fact, been the result of an extensive system of exchanges, the publications of the Institution having been used to obtain similar publications from institutions of learning in all parts of the world.

The value of the books distributed since the Institution was opened, must have been nearly $1,000,000, or nearly twice the original bequest of Smithson.[1] Many of these publications are now out of print.

In return for these, and by purchase, it has received the great collection of books which forms its library and which is one of the richest in the world in the publications of learned societies, and therefore of inestimable value, containing, as it does, the record of actual progress in all that pertains to the mental and physical development of the human family, and affording the means of tracing the history of every branch of positive science since the days of the revival of letters until the present time. This library was, in 1865, deposited at the Capitol, as a portion of the Congressional Library.

The Smithsonian Collection, which includes more than three hundred thousand volumes and parts of volumes, constituting perhaps one-fourth of the National Library, is to be installed in a special hall of its own upon the main floor of the new library building. The rapidity with which it is increasing is indicated by the fact that more than 32,000 titles were added during the past fiscal year.[2]

The Institution has probably done more toward building up a great library in Washington than would have been possible had all its income been devoted strictly to library work, as was at one time seriously proposed.

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[1] This estimate is based upon the prices which are charged for the books by second-hand dealers, as shown in their catalogues.

[2] The working libraries of the National Museum and the Bureau of Ethnology are distinct from the general Smithsonian library and are separately administered. All of these are placed at the service of advanced students and specialists.

The books are still deposited chiefly in the Capitol, but though their number has been so largely increased year by year, now forming one of the most valuable collections of the kind in existence, they not only remain unbound, but in a far more crowded and inaccessible condition than they were before the transfer, a condition of affairs which, it is hoped, will soon be remedied.

The purchasing power of the publications of the Institution, when offered in exchange, is far greater than that of money, and its benefit is exerted chiefly in behalf of the National Library, and also to a considerable extent in behalf of the National Museum.

The amount expended during the past forty years from the private fund of the Institution, in the publication of books for gratuitous distribution, has been fully half as much as the original Smithson bequest.

These publications have had their influence for good in many ways; but, in addition to this, a library much more than equal in value to the outlay has, through their buying power, come into the possession of the nation.

In addition to all this, a large amount of material has been acquired for the Museum by direct expenditure from the private fund of the Smithsonian Institution. The value of the collections thus acquired is estimated to be more than equal to the whole amount of the Smithson bequest.

The early history of the Museum was much like that of the library. It was not until 1858 that it became the authorized depository of the scientific collections of the Government, and it was not until after 1876 that it was officially recognized as the National Museum of the United States.

But for the provident forethought of the Smithsonian Institution, the United States would probably still be without a reputable nucleus for a national museum.

The relations of the Museum to the system of popular lectures, for many years established in Washington, which replaces the old Smithsonian courses, once so influential, and the assistance which it affords each year to students of science, are referred to elsewhere in this report.

The Institution publishes many circulars giving information on scientific subjects, which are distributed gratuitously to those who write to make inquiries, and this system is being continually extended. In addition to this, a large correspondence is carried on with people in search of information on scientific topics. Probably not less than 7,500 letters a year go out to people who write seeking to know the name of some object or other scientific fact. Inquiries of this kind are always answered promptly and fully; and frequently, to intelligent inquirers, books are sent which will enable them to find out such names for themselves in future. This work has not only an educational value, but often a great economic importance as well, as, for instance, when some common min-

eral has been mistaken for one of value, some useless plant has been wrongly identified and supposed to be of service in medicine, or some harmless animal feared as noxious.

The publications of the Institution and its dependencies reach every State and almost every county in the United States. A careful study of the subject, recently made by the president of one of the scientific societies in Washington, seems to indicate that there are several States which are reached by no scientific publications whatever except those distributed gratuitously by the Government.

Speaking of the Smithsonian Institution proper, and not of the Museum or any other trust which it administers, it may be positively stated that in the execution of the trust of Smithson more has been given to the Government than has been received. The machinery of the Institution's action has been such that it has incidentally, in connection with its legitimate work for the increase and diffusion of knowledge, paid over to the Government the equivalent of much more than the whole original fund.

Can the United States fail to recognize its obligation to supplement liberally this private contribution for public good, especially if it be borne in mind that, as Secretary Langley has shown, the Institution has left in perpetual charge of the nation, in the Museum alone, property acquired out of its private fund which is now more than equal in value to the whole amount of the Smithson bequest?

Every museum has its special characteristics growing out of its form of organization, its location, scope, and financial and other resources. The character of the National Museum is fundamentally affected by its connection with the Smithsonian Institution, its dependence upon Congress for appropriations annually, and the necessity, under existing laws, of its caring for all collections belonging to the Government.

Of the connection of the Museum with the Smithsonian Institution, it should be said that it is in the highest degree advantageous. It should be borne in mind that it is essentially a Smithsonian museum, since, especially in its earlier history, the Institution expended large sums of money in aiding explorations, with the distinct purpose of increasing the collections in certain directions, while of late years it has deposited all the valuable gifts and bequests of specimens it has received. It has had in addition, for nearly half a century, the use of the larger portion of the Smithsonian building, and, what is of paramount importance, the guidance and influence of the officers of the Institution, and the very valuable assistance of its numerous correspondents.

C.—The Work of the Museum in Public Education.

The work of the Museum, if it only performed the functions of an institution for scientific investigation, would be of sufficient value to justify its maintenance and extension. The Museum, however, not

only performs these functions, but also does a very great deal to render the resources of science available to the public at large.

The National Museum is a treasure-house filled with materials for the use of investigators, and it is also an agency for the instruction of the people of the whole country.

In a recent address before the American Historical Association, I attempted to explain the idea of our work as follows:

(1) That public institutions of learning are not intended for the few, but for the enlightenment and education of the masses.

(2) That the public has a right to full participation in the results of the work of the scientific establishments which they are helping to maintain.

(3) That one of the chief duties of the officers of these institutions is to provide means by which such results may be presented in an attractive as well as an intelligible form.

No scientific institution is more thoroughly committed to the work of the diffusion of knowledge than is the Smithsonian Institution, and no department of its activity has greater possibilities in this respect than the National Museum.

The benefits of the Museum are extended not only to the specialists in its laboratories and to the hundreds of thousands of visitors from all parts of the United States who pass its doors each year, but to local institutions and their visitors throughout the country, through the distribution of the duplicate specimens in the Museum, which are made up into sets, accurately named, and distributed to schools and museums. Every museum in the United States has profited in this way, and by its system of exchange the Museum has, while enriching itself, contributed largely to the stores of every important scientific museum in the world.

Not only are specimens thus sent out, but aid is rendered in other ways. Within the last year many local museums in the United States were supplied with working plans of cases in use in the Museum, and similar sets of plans have been supplied within the past few years to national museums in other countries.

Not only do the people of the country at large profit by the work of the Smithsonian, as made available to local institutions, but also to a very considerable extent directly and personally.

The curator of each department in the Museum is expected to be an authority in his own line of work, and the knowledge of the whole staff of experts is thus placed, without cost, at the service of every citizen.

It is much to be regretted that many specialists, intent chiefly upon the study of certain scientific problems in which they individually are absorbed, are disposed to neglect the claims of the educated public to the enjoyment and instruction which museums afford. They do not hesitate to say that scientific museums should be administered for the

benefit solely of persons engaged in research. Such men would find no welcome among us.

The experience of Europe, with its magnificent public museums, and the history of the several expositions in the United States should be quite sufficient to satisfy anyone who has studied the matter, that the museum is an educational power even more influential than the public library.

The venerable director of the South Kensington Museum, the late Sir Philip Cunliffe Owen, speaking from an experience of thirty-five years, not only in his own establishment, but in the work of building up the score of affiliated museums in the various provincial towns of Great Britain, remarked to the writer:

> We educate our working people in the public schools, give them a love for refined and beautiful objects, and stimulate in them a desire for information. They leave school, go into the pursuits of town life, and have no means provided for the gratification of the tastes which they have been forced to acquire. It is as much the duty of the Government to provide them with museums and libraries for their higher education as it is to establish schools for their primary instruction.

In the same conversation Sir Philip insisted very strongly that a museum not actually engaged in educational work of some kind could not long survive, pointing to the great system of lectures and examinations connected with the Science and Art Department of the Council of Education, of which the South Kensington Museum was one of the chief agencies.[1]

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[1] No new general statement relating to the history, organization, and activities of the National Museum having been prepared by Dr. Goode prior to his death, the foregoing paragraphs are repeated from the Report of 1895, with a few minor changes, bringing the subject down to date.—EDITOR.

II.—SPECIAL TOPICS OF THE YEAR.

THE MUSEUM STAFF.

There has been no change during the year in the number of scientific departments and sections in the Museum or in the number of administrative divisions.

Prof. C. V. Riley, honorary curator of the department of insects in the National Museum, and for many years entomologist of the Department of Agriculture, died on September 14, 1895. Mr. L. O. Howard, who was recently appointed entomologist of the Department of Agriculture, has also accepted the position held by Professor Riley in the Museum.

Mr. D. W. Coquillett has been appointed custodian of the collection of Diptera, Mr. W. H. Ashmead of the Hymenoptera, Mr. O. F. Cook of the Myriapoda, and Mr. E. A. Schwarz of the Coleopterous larvæ.

All of the appointments above mentioned were made under date of October 8, 1895.

Mr. George C. Maynard, of this city, was appointed custodian of the electrical collections in March, 1896, and Dr. C. Hart Merriam, of the Department of Agriculture, has been made an Associate in Zoology.

Mr. R. E. Earll, editor of Proceedings and Bulletins, died on March 19, 1896. Dr. Marcus Benjamin was appointed on April 1 to fill the vacancy thus made.

A complete list of the officers of the Museum will be found in Appendix I.

ACCESSIONS TO THE COLLECTIONS.

There have been 1,299 accessions during the year, an increase of 76 over the record for preceding fiscal year, and of 138 over the record for the year ending June 30, 1894. These accessions embrace 73,104 specimens, and were included between accession numbers 29535 and 30833. The appended tables show, respectively, the number of specimens received by the various departments of the Museum during the year, and the total number of specimens in those departments on June 30, 1896. It will be seen that the number of specimens now in the Museum is estimated at more than 3,500,000.

Number of specimens received in 1895–96.

Department.	Specimens.
Arts and industries:	
Materia medica	3
Animal products	11
Graphic arts	59
Transportation and engineering	112
Naval architecture	12
Historical collections	1,053
Musical instruments	43
Modern pottery, porcelain, bronzes, etc	268
Domestic animals	14
Ethnology	2,828
Pueblo collection	1,553
Oriental antiquities and religious ceremonials	300
Prehistoric anthropology	5,826
Mammals (skins and alcoholics)	1,048
Birds	8,488
Birds' eggs and nests	1,883
Reptiles and batrachians	329
Fishes	3,000
Mollusks	3,173
Insects	7,000
Marine invertebrates	4,831
Helminthological collection	[1] 1,444
Comparative anatomy:	
Mammals	207
Birds	
Reptiles and batrachians	
Fishes	
Paleontology:	
Vertebrate fossils	81
Invertebrate fossils—	
Paleozoic	832
Mesozoic	2,574
Cenozoic	3,663
Fossil plants	2,616
Recent plants	17,118
Minerals	1,073
Geology	1,662
Total	73,104

[1] Number of catalogue entries during the year.

Number of specimens in the departments of the Museum on June 30, 1896.

Department.	Specimens.
Arts and industries:	
Materia medica	6,325
Foods	1,114
Textiles	4,942
Fisheries	10,080
Animal products	3,039
Graphic arts	5,620

Number of specimens in the departments of the Museum on June 30, 1896—Continued.

Department.	Specimens.
Arts and industries—Continued.	
Forestry	749
Transportation and engineering	1,911
Naval architecture	1,331
Historical collections	31,349
Musical instruments	1,343
Modern pottery, porcelain, bronzes, etc	3,865
Paints and dyes	197
Physical apparatus	366
Oils and gums	1,112
Chemical products	
Domestic animals	217
Ethnology	428,470
American aboriginal pottery	[1]33,368
Pueblo collection	[2]1,553
Oriental antiquities and religious ceremonials	[3]3,020
Prehistoric anthropology	209,346
Mammals (skins and alcoholics)	15,215
Birds	100,000
Birds' eggs and nests	61,947
Reptiles and batrachians	35,619
Fishes	150,000
Mollusks	600,000
Insects	630,000
Marine invertebrates	527,209
Helminthological collection	[4]1,550
Comparative anatomy:	
Osteology	15,285
Anatomy	
Paleontology:	
Vertebrate fossils	316,812
Invertebrate fossils—	
Paleozoic	
Mesozoic	
Fossil plants	
Recent plants	286,126
Minerals	27,557
Geology	72,249
Total	3,588,886

[1] The aboriginal pottery, with the exception of the Pueblo series, has been transferred to the department of prehistoric anthropology. Since the figures showing the number of specimens so transferred have not yet been made up, the record for the previous year will be allowed to stand for the present.

[2] These figures represent the additions to the Pueblo collections during the year.

[3] These figures are based upon an actual count.

[4] Number of catalogue entries to June 30, 1896.

The following statement shows the number of accessions annually since 1881:

Year.	Accession numbers (inclusive).	Number of accessions during the year.
1881	9890–11000	1,111
1882	11001–12500	1,500
1883	12501–13900	1,400
1884	13901–15550	1,650
1885 (January to June)	15551–16208	658
1886	16209–17704	1,496
1887	17705–19350	1,646
1888	19351–20831	1,481
1889	20832–22178	1,347
1890	22179–23340	1,162
1891	22341–24527	1,187
1892	24528–25884	1,357
1893	25885–27150	1,266
1894	27151–28311	1,161
1895	28312–29534	1,223
1896	29535–30833	1,299

In Appendix II will be found a detailed list of the accessions during the year, arranged alphabetically by names of contributors.

CATALOGUE ENTRIES.

The number of catalogue entries during the year is shown in the following table:

Department.	Entries.
Arts and industries:	
Materia medica	3
Animal products	11
Musical instruments	43
Transportation and engineering	12
Naval architecture	12
Modern pottery, porcelain, bronzes, etc	236
Graphic arts	59
Domestic animals	14
Ethnology	1,556
Pueblo collection	968
Oriental antiquities and religious ceremonials	132
Prehistoric anthropology	746
Mammals	7,643
Birds	8,488
Birds' eggs and nests	483
Reptiles and batrachians	329
Fishes	183
Mollusks	5,449
Insects	205
Marine invertebrates	1,056
Helminthological collection	1,444

Department.	Entries.
Comparative anatomy:	
Mammals	78
Birds	
Reptiles and batrachians	
Fishes	
Paleontology:	
Vertebrate fossils	73
Invertebrate fossils—	
Paleozoic	324
Mesozoic	328
Cenozoic	1,222
Fossil plants	1,074
Recent plants	236
Minerals	148
Geology	688
Total	33,243

APPROPRIATIONS FOR 1896–97.

For the fiscal year ending June 30, 1897, the amount appropriated for the maintenance of the Museum is $207,725, an increase of $21,600 over the appropriation for the year covered by this report. The items are given below:

Preservation of collections	$153,225
Furniture and fixtures	15,000
Printing (labels, Proceedings, Bulletins, and binding)	12,000
Heating and lighting	13,000
Repair of buildings, shops, and sheds	4,000
Erection of galleries	8,000
Rent of workshops	2,000
Postage	500
Total	207,725

EXCHANGES OF SPECIMENS WITH INSTITUTIONS AND INDIVIDUALS ABROAD.

Numerous exchanges with foreign museums and individuals have been effected during the year. The sendings from the U. S. National Museum have been unusually large, including several carefully selected duplicate sets of fishes. These have been presented to some of the most prominent museums in different parts of the world. A condensed statement of these exchanges is here presented:

Mammals.—A mounted specimen of *Didelphys virginiana* and a rough skeleton of the same species have been sent to the Australian Museum, Sydney, New South Wales, Mr. R. Etheridge, jr., curator, in continuation of exchanges.

A collection of mammals, including skins and skulls of *Neürotrichus*, has been sent to the Museum of Natural History, Genoa, Italy, Mar-

quis Giacoma Doria, director, in return for material already received by the Museum.

From the Horniman Museum, London, England, Mr. Richard Quick, curator, have been received mammal bones, in return for a set of casts of prehistoric implements.

Birds.—Three birds' skins have been sent to Mr. Stefan Chernel von Chernelháza, Köszeg, Hungary, in return for similar material.

Two birds' skins have been sent to Mr. Ernst Hartert, Tring Museum, Tring, England, for which material has been received in return.

A collection of ores, birds, and other natural history specimens has been received from the La Plata Museum, La Plata, Argentina, for which an equivalent has been sent.

Reptiles and batrachians.—Mr. Edgar J. Bradley, Happy Valley Waterworks, South Australia, transmitted specimens of lizards, for which foraminiferous material has been sent in return.

Specimens of reptiles from Argentina have been received from the La Plata Museum, for which an equivalent has been sent.

Fishes.—Collections of fishes from the North Pacific Ocean and Bering Sea, and also from the Atlantic and Pacific oceans, principally deep-sea forms, selected from the duplicate collections in the Museum, have been sent to the British Museum, London, England, Sir William Flower, director; Imperial Zoological Museum, Vienna, Austria, Dr. Franz Steindachner, keeper; La Plata Museum, La Plata, Argentina, Dr. Francisco P. Moreno, director; Museum of Natural History, Paris, France, Prof. A. Milne-Edwards, director; Royal Zoological Museum, Berlin, Germany, Prof. Karl Möbius, director; Royal Zoological Museum, Copenhagen, Denmark, Dr. Christopher Lütken, director; and Zoological Museum, Christiania, Norway, Prof. Robert Collett, director.

A collection of ninety-three species of American fishes was sent to Prof. Sebastiano Richiardi, Ministero dell' Istruzione Publica, Rome, Italy, for which desirable material is expected in return.

Mollusks.—Shells have been received from Mr. Edgar J. Bradley, Happy Valley Waterworks, South Australia, for which foraminiferous material has been sent in return.

Specimens of *Odostomia lactea*, Jeff., have been received from Mr. G. W. Chaster, Southport, England, for which specimens of Pyramidellidæ have been sent in return.

A specimen of *Mytilus californicus* has been sent to the Royal Zoological Museum, Florence, Italy, Prof. Henry H. Giglioli, director, in continuation of exchanges.

Dr. H. von Ihering, director of the Paulista Museum, São Paulo, Brazil, has sent specimens of South American and Mexican land, freshwater, and marine shells, for which an equivalent in shells and other material has been forwarded.

Insects.—Mr. Edgar J. Bradley, Happy Valley Waterworks, South

Australia, has transmitted a specimen of *Myrmecia formicata*, Fab., for which an equivalent in foraminiferous material has been sent.

Mr. E. Brunetti, London, England, has sent, through the Department of Agriculture, specimens of British Diptera.

A collection of South American butterflies has been received from Mr. J. G. Foetterle, Petropolis, Brazil, in partial return for which publications have been sent.

Three species of termites from Borneo and Natal have been received from Mr. G. D. Haviland, Museum of Zoology, Cambridge, England, for which similar material has already been sent in exchange.

Material from Mammoth Cave, Kentucky, has been sent to Mr. George E. Mason, London, England.

Marine invertebrates.—Crabs, a hermit-crab, and two crayfishes, also eleven specimens of *Chasmagnathus haswellianus*, Whitelegge, have been received from Mr. Edgar J. Bradley, Happy Valley Waterworks, South Australia, for which foraminiferous material has been sent in return. Mr. Bradley has also forwarded other marine invertebrates, including specimens of *Branchiopus*, for which specimens of *Rhabdammina abyssorum* have been sent in exchange.

A specimen of *Typhlomolge rathbuni* has been sent to the British Museum of Natural History, London, England, Sir William Flower, director, in continuation of exchanges.

Fourteen species of echinoderms, dredged by H. M. S. *Pola* in the eastern Mediterranean during 1890–1894, have been received from the Imperial Zoological Museum, Vienna, Austria, Dr. Franz Steindachner, keeper, in return for material already sent and in continuation of exchanges.

A specimen of *Uhlias limbatus*, Stimpson, and other crabs have been received from Mr. P. W. Jarvis, Kingston, Jamaica, for which similar material has been sent in exchange.

Two specimens of *Pentacrinus decorus* and one specimen of *Pentacrinus müller*i, have been sent to the University of Stockholm, Stockholm, Sweden, Dr. William Leche, in exchange for material to be received.

A box of crabs has been sent to the Rev. A. M. Norman, Burnmoor Rectory, Fence House, Durham, England, in exchange.

A specimen of *Pentacrinus decorus* has been sent to Prof. Sebastiano Richiardi, Ministero dell 'Istruzione Publica, Rome, Italy, for which an equivalent has been promised in return.

Five specimens of amphipods have been sent to Rev. T. R. Stebbing, Ephraim Lodge, Tunbridge Wells, England, for which material has been promised in return.

Twenty-five specimens of crustaceans have been sent to Prof. Joseph Nobili, Zoological Museum, Turin, Italy, for which material will be transmitted in exchange.

Helminthology.—Prof. Raphael Blanchard, Paris, France, has forwarded alcoholic specimens of worms, in exchange for microscopic slides of worms already sent by the Museum.

Dr. Gustav Brandes, Zoological Institute, Halle, Germany, has forwarded specimens of *Ctenotænia leuckarti* (=cotype of *Dipylidium leuckarti*); *Ctenotænia gorzei* (=cotype of *Dipylidium latissimum*), and *Ctenotænia pectinata* (=*Dipylidium pectinatum*, Riehm).

Geheimrath Rudolf Leuckart, Zoological Institute, Thalstrasse, Leipsic, Germany, has sent a specimen of *Bertia mucronata*, a specimen of *Tænia rhopaliocephala*, and a specimen of *Tænia rhopalocephala*.

A collection of parasites determined by Prof. M. Stossich, Trieste, Austria, has been received from him, in continuation of exchanges.

Dr. O. von Linstow, Gottingen, Germany, has sent specimens of *Bothriocephalus quadratus*, von Linstow, in continuation of exchanges.

Comparative anatomy.—Skeletons of turtles, *Chelydra serpentina* and *Macrocelys lacertina*, have been sent to the Australian Museum, in continuation of exchanges.

Birds and mammal skeletons have been received from the La Plata Museum, La Plata, Argentina, Dr. Francisco P. Moreno, director, for which an equivalent has been sent.

Paleontology.—Specimens of fossils, representing ninety-three species, have been sent to Mr. Walter R. Billings, Ottawa, Canada, in exchange for Trenton brachiopods.

Fourteen specimens of *Branchiosaurus amblystomus* from the Middle Permian of Germany have been received from Dr. Herman Credner, Leipsic, Germany, for which material will be sent in return.

Specimens of Hamilton group fossils have been received from Rev. Hector Currie, Thedford, Ontario, Canada, and fossils representing twelve species have been forwarded in exchange from the Museum.

A large collection of Clinton and Niagara group fossils from the vicinity of Hamilton, Ontario, have been received from Col. Charles Coote Grant, of Hamilton. Similar material has been transmitted to him by the Museum.

Two specimens of *Calymene platys* and a specimen of *Phillipsastrea* sp. have been received from Mr. S. W. Howard, Hagersville, Ontario, Canada. Specimens of fossils have been sent in return.

Mr. George Kernahan, Thedford, Ontario, Canada, has transmitted a collection of fossils, for which an equivalent has been sent.

Mr. N. J. Kearney, Thedford, Ontario, Canada, has sent fossil material. Specimens have been sent in return.

Specimens of Paleozoic, Mesozoic, and Tertiary fossils have been received from the La Plata Museum, La Plata, Argentina, Dr. Francisco P. Moreno, director, for which an equivalent has been sent.

A large collection of fossils has been received from R. Macintosh, Esq., Thedford, Ontario, Canada, for which an equivalent will be sent by the Museum.

One hundred and sixty-five English graptolites, representing twenty-two genera and fifty-four species, have been received from Dr. Prof. H. Alleyne Nicholson, Aberdeen, Scotland, for which an equivalent has been sent.

Prof. A. Pavlow, Moscow, Russia, has transmitted specimens of Russian Cretaceous fossils, for which an equivalent has been forwarded by the Museum.

A collection of graptolites has been sent to Dr. S. L. Tornquist, Lund, Sweden, in return for material already received by the Museum.

A collection of Miocene fossils has been received from Mr. L. Vignal, Paris, France, for which Tertiary fossils have been sent in return.

Botany.—Five hundred and eleven herbarium specimens have been received from the Calcutta Botanical Garden, Calcutta, India, Lieut. Col. G. King, superintendent, in continuation of exchanges.

Ten species of North American diurnals, new to the Museum collection, have been transmitted by Mr. H. J. Elwes, Colesborne, Andoversford, Gloucestershire, England, in exchange for material sent by the Museum.

Four hundred specimens of dried plants have been sent to Dr. G. von Beck, Imperial Royal Natural History Museum, Vienna, Austria, in exchange for specimens of cryptogams.

Two hundred and fifty specimens of Umbelliferæ from the Royal Botanic Garden, Kew, England, Dr. W. T. Thiselton-Dyer, director, have been received in continuation of exchanges.

One hundred and twenty herbarium plants have been sent to St. John's College, Shanghai, China, Mr. F. L. Hawks Pott, manager, for which material has been promised in return.

Prehistoric anthropology.—A collection of archæological objects has been received from Prof. Giuseppe Bellucci, Perugia, Italy.

Archæological objects from Europe, Asia, Africa, and Australia have been received from the Royal Zoological Museum, Florence, Italy, Prof. Henry H. Giglioli, director. A specimen of *Mytilus* has been sent by the Museum in continuation of exchanges.

Fragments of pottery have been received from the Horniman Museum, London, England, Mr. Richard Quick, curator, for which an equivalent has been sent.

Casts of prehistoric implements have been sent to the La Plata Museum, La Plata, Argentina, Dr. Francisco P. Moreno, director, in return for specimens already sent to the Museum.

A collection of tinted casts of prehistoric implements has been sent to the Museum of the Natural History Society of New Brunswick, St. John, New Brunswick, in exchange for archæological objects from Charlotte and Queen counties, New Brunswick, and Homosassa, Fla.

Ethnology.—Specimens of Pueblo pottery have been sent to the Canterbury Museum, Christchurch, New Zealand, Mr. F. W. Hutton, curator, in continuation of exchanges.

Ethnological objects have been received from Mr. Wohlgemuth Carl, Bozen, Austria, for which an equivalent had been previously sent by the Museum.

Prof. Henry H. Giglioli, director of the Royal Zoological Museum,

Florence, Italy, has transmitted a collection of ethnological objects from Europe, Asia, Africa, and Australia. A specimen of *Mytilus* has been sent by the Museum.

A complete set of the annual reports of the Museum and a small collection of ethnological objects have been forwarded by the Museum to Dr. H. von Ihering, director, Paulista Museum, São Paulo, Brazil, in continuation of exchanges.

Ethnological objects from New Guinea, have been received from Dr. Alfred C. Haddon, Cambridge, England, for which electrotypes of illustrations in the annual reports of the Bureau of Ethnology have been sent in exchange.

Ethnological objects have been received from the Horniman Museum, London, England, Mr. Richard Quick, curator, for which an equivalent has been sent.

Six ethnological objects have been received from Mr. Edward Lovett, Croydon, England, in continuation of exchanges.

Ethnological objects have been transmitted by the Lubny Museum, Government of Poltava, Little Russia, in return for material already sent by the Museum.

Geology.—Petroleum, rocks, and sands have been sent to Mr. Joseph E. Carne, Sydney, New South Wales, in exchange for material already received.

A specimen of peat has been received from the Horniman Museum, London, England, Mr. Richard Quick, curator, for which an equivalent has been sent.

Ores have been received from the La Plata Museum, La Plata, Argentina, Dr. Francisco P. Moreno, director, for which an equivalent has been sent.

COOPERATION OF THE EXECUTIVE DEPARTMENTS OF THE GOVERNMENT.

The increase in the collections during the year, resulting directly or indirectly from assistance rendered by the Executive Departments and Bureaus of the Government, or by officials whose duties have enabled them to collect for the Museum or to influence and encourage others in so doing, has been very satisfactory.

The active support which the Museum has always enjoyed at the hands of American ministers and consuls stationed abroad has been most gratifying. During the year covered by this report a series of photographs and etchings were transmitted by Mr. R. M. Bartleman, United States consul, Antigua, West Indies. Mr. Alfred Krauss, United States consular agent, Zittau, Germany, has forwarded geological material. Hon. W. W. Rockhill, Assistant Secretary of State, whose generous gifts have been so often alluded to in the reports, has continued to aid the Museum. Mr. Henry C. Smith, United States consul, Santos, Brazil, transmitted a sloth, in behalf of Mr. Gustave G. Beyer.

The prompt compliance of the Treasury Department with requests for the free entry of material from abroad, and the continued courtesies extended by the collector of customs in connection with its transportation to Washington, have resulted in saving much time and money to the Museum, and the assistance thus rendered is very highly appreciated.

The Museum is indebted to Capt. J. H. Long, keeper of the life-saving station at Fenwicks Island, Delaware, for the skeleton of a Finback Whale.

Lieut. J. H. Scott, of the United States revenue-marine cutter *Forward*, has transmitted a specimen of Hawk Moth, *Enyo lugubris*.

The War Department has continued to grant the usual facilities of the Quartermaster's Department for the transmission of bulky material from regions where ordinary means of transportation could not be utilized, except at great expense to the Museum.

Several officers of the United States Army have interested themselves in obtaining material for the Museum from various parts of the United States, South America, and the West Indies. Prominent among them are Dr. Edgar A. Mearns, Maj. Charles Bendire, Capt. W. C. Brown, Capt. Henry Romeyn, Lieut. Wirt Robinson, Dr. E. R. Hodge, Dr. W. M. Brewer, Dr. D. S. Lamb, Dr. Washington Matthews, and Dr. J. C. Merrill. Mr. Isaac C. Noyes, of the Army Medical Museum, transmitted an archæological object from Virginia.

The Museum is indebted to officers of the Navy for several interesting contributions to the Museum collections. Through the aid of Lieut. Commander S. M. Schley valuable additions to the collections have been obtained. Dr. James M. Flint continues to act as honorary curator of the section of materia medica in the Museum.

Under the Department of the Interior, the United States Geological Survey has transmitted a large number of collections made by members of its staff while engaged in field duty. Among these should be especially mentioned Prof. F. W. Clarke, Dr. David T. Day, Dr. T. M. Chatard, Dr. W. H. Dall, and Mr. T. W. Stanton. Hon. Charles D. Walcott, Director of the Survey, has transmitted specimens illustrating the Lower Cambrian formation from the White Mountain Range, Inyo County, Cal., and Carboniferous limestone fossils from Berne, Albany County, N. Y. The collections received from the Survey are enumerated in the List of Accessions (Appendix II).

Dr. Z. T. Daniel, of the Indian Office, who for many years has contributed information concerning Indian ceremonies, as well as numerous specimens, has continued to manifest active interest in the ethnological department of the Museum.

Mr. Charles E. Davis, Indian agent, Colorado River Agency, Parker, Ariz., presented a model of a raft constructed by the chief of the Mojave Indians.

From the Bureau of Education was received a photograph of twin Eskimo children at Port Clarence, Alaska.

Perhaps no bureau of the Government has been in closer affiliation with the National Museum in past years than the United States Fish Commission. Since its organization in 1871 the Museum has been constantly enriched by the acquisition of large collections, especially of fishes and marine invertebrate objects. These departments in the Museum have hitherto been cared for by officers of the Fish Commission, and their honorary position as curators in the Museum, it is thought, has been a source of much mutual benefit to the Commission and the Museum. The collections of special interest from the Commission during the present year were gathered principally by, or through the cooperation of, Prof. B. W. Evermann, Dr. Hugh M. Smith, and Mr. Charles H. Townsend.

The collections received during the year from the different bureaus of the Department of Agriculture have been large and varied. The botanical collections, under the care of Mr. F. V. Coville, Botanist of that Department, have been greatly enriched. Large quantities of interesting botanical material have been obtained from different sections of the country, through the agency of collectors connected with the Department of Agriculture. In the classification of plants, etc., as well as in obtaining material, Prof. F. L. Lamson-Scribner, Dr. J. N. Rose, and Mr. J. B. Leiberg have been conspicuous in their efforts.

The services of Mr. L. O. Howard, entomologist of the Department, who succeeded Prof. C. V. Riley as honorary curator of the department of insects in the National Museum, have resulted in the addition of numerous specimens to the Museum collection. In the classification and identification of the collections of Hymenoptera, Coleoptera, and Diptera he has been ably assisted by Messrs. Ashmead, Linell, and Coquillett. The Museum is also indebted to Mr. E. A. Schwarz for large collections of different orders of insects collected by him.

Through Dr. C. Hart Merriam, Chief of the Biological Survey, types and other specimens of fishes collected by the Death Valley Expedition and described by Prof. C. H. Gilbert, have been transferred to the Museum. Fishes, crabs and shrimps, land and fresh-water shells, collected by Messrs. Nelson and Goldman in Mexico and in the western part of the United States, have been received, as well as large quantities of other material obtained by collectors attached to the Department of Agriculture.

The Bureau of Animal Industry, under the direction of Dr. D. E. Salmon, has been instrumental in adding to the Museum some very interesting material. Among the most valuable collections of parasites transmitted by the Bureau are those made by Dr. C. W. Stiles, the honorary custodian of the helminthological collections of the National Museum.

The collections which have been received from the Bureau of Eth-

nology have been not only large in numbers, but of great importance. Particular mention is here made of the material obtained by Dr. J. Walter Fewkes in connection with his explorations in Arizona and New Mexico, under the direction of the Smithsonian Institution.

EXPLORATIONS.

Dr. William L. Abbott has continued his explorations in Africa and India, and the collections which he has forwarded to the Museum during the year have been of unusual interest and importance. The value of the ethnological objects included in his collections has been very greatly enhanced by the full and accurate descriptions accompanying them. A series of skins of lemurs and of the insectivores peculiar to Madagascar is of special interest. The material is carefully prepared and unusually well preserved.

An interesting collection of antiquities was obtained by Dr. J. Walter Fewkes during the summer of 1895 from the cliff dwellings and ancient pueblos near Tusayan, Ariz.

During the travels of Lieut. Wirt Robinson, United States Army, in the West Indies and South America, he obtained some desirable natural-history material for the Museum.

For several years Dr. Edgar A. Mearns, United States Army, has been an enthusiastic co-operator in the work of the National Museum. In connection with the Boundary Commission between the United States and Mexico he made very extensive and valuable collections for the Museum, and has later been instrumental in various ways in adding natural-history material to its collections. During 1896 he collected for the Museum mammals, birds, and other natural-history specimens in Virginia, Pennsylvania, and along the Gulf of California.

A large collection of human bones was obtained by Gen. A. L. Pridemore, Jonesville, Va., while engaged in mound explorations in Scott County. This collection has been generously presented by him to the National Museum.

Dr. R. Ellsworth Call, Cincinnati, Ohio, has explored the Mammoth Cave and other caves in Kentucky. In the former he obtained several interesting specimens of bats, which he has presented to the Museum.

COLLECTORS' OUTFITS.

Outfits to be used in collecting specimens for the National Museum have been furnished to the following persons during the year: Dr. Edgar A. Mearns, United States Army, Gettysburg, Pa.; Mr. C. W. Richmond, United States National Museum, for collecting in Virginia; Prof. C. H. Gilbert, care of United States consul, Panama, Colombia, South America; Rev. P. H. Sörensen, Jakobshavn, North Greenland; Prof. R. Ellsworth Call, 317 Walnut street, Cincinnati, Ohio; Mr. Robert Ridgway, United States National Museum, for collecting in

Florida; Mr. E. W. Vickers, Ellsworth, Ohio; Dr. Frank Furlong, care of the steamship *Galilee*, Brooklyn, N. Y.; Mr. Frank Burns, Suffolk, Va.; Dr. J. Walter Fewkes, for collecting in Arizona, and Mr. A. W. Anthony, San Diego, Cal.

DEVELOPMENT AND ARRANGEMENT OF THE EXHIBITION SERIES.

In the department of mammals the exhibition series is practically unchanged. A few specimens were withdrawn for a time for exhibition at Atlanta. The type of Chanler's Reed Buck was put on a new stand and added to the exhibition series, and a young lion and young tiger were also placed upon exhibition.

In the department of mollusks the exhibition series is in good condition, and has been beautified by the addition of a series of mounted specimens illustrating the chief families of mollusks exhibited at the Cotton States and International Exposition at Atlanta. A portion of the exhibition series in the department of insects is now displayed in the small room adjoining the hall occupied by the department of comparative anatomy. The work of renovating the mounted collection in the department of birds, which was begun during the last fiscal year, has been continued. The exhibition series of birds' eggs and nests is in good condition, and it would be very desirable to increase it, were this course now practicable.

The synoptic series of invertebrates has been transferred from the department of marine invertebrates to the department of comparative anatomy, and the space which it formerly occupied will be devoted to an exhibit of deep-sea fishes. Some slight changes have been made in the cases in the west hall of the Smithsonian building, and a number of deep-sea sponges and corals, together with some holothurians in alcohol and a few starfishes, have been placed upon exhibition. Labels have been printed for the holothurians, and labels for the starfishes are in preparation. All of the named sponges on exhibition have also been provided with printed labels. The table cases in this department have been provided with casters, so that they may be readily moved without danger of injuring the specimens. In the department of fishes there are five cases of plaster casts on exhibition, one case containing stuffed fishes, a large number of casts on the tops of cases, and a small group of land Gobies.

The mounting of the exhibition series of Mesozoic and Tertiary plants is now practically finished. In order to test the advantages of mounting fossils upon tiles, the historical collection of fossils in the department of geology was mounted in this manner. The results are considered to be quite satisfactory. Although the tiles are necessarily somewhat heavy, they are found to possess decided advantages over paper, wood, slate, or ground-glass tablets. The study series of invertebrate fossils has received attention, but much remains to be done before an intelligent selection can be made for the final exhibition series.

A considerable amount of vertebrate material is nearly ready for installation in the exhibition series, and additional space for this purpose is much needed.

A great deal of detail work has been accomplished in connection with the exhibition series in the department of minerals, and as a result the appearance of the collections is much improved.

In the department of geology the historical series, the volcanic and elementary series, and the collections illustrating rock weathering and glaciation have been entirely rearranged. A large amount of work has also been done in the hall devoted to the economic series. That portion of the geological collections which is on exhibition is, all things considered, in very good condition, although, on account of the overcrowded condition of the hall and of the cases themselves, the appearance of the collections is not all that could be desired.

In the west hall, which is devoted to the department of ethnology, are exhibited the objects connected with (1) Negroid Africa, (2) the Malayo-Polynesian or Indo-Pacific peoples, and (3) various Asiatic peoples. All of the Mexican and part of the Nicaraguan and Costa Rican collections in the department of prehistoric anthropology have been placed upon exhibition. This work necessitated the rearrangement of the cases already devoted to objects from these countries. As many as possible of the unbroken vessels from mounds in the United States were placed upon exhibition.

The collection of boats has been overhauled, the larger ones being suspended from the ceiling. Many models of boats have been repaired.

In the east hall two new cases have been erected for the accommodation of the electrical collections and the series illustrating methods of land transportation.

The condition of the exhibition series in the section of graphic arts remains practically the same as at the close of the preceding fiscal year. Although the collection is not considered complete, it probably illustrates better than any other collection of its kind, either in this country or abroad, the technical development of the reproductive processes.

The collections of oriental antiquities and religious ceremonial objects are exhibited in the east and west halls immediately adjoining the rotunda. In the northeast alcove the Egyptian collection is installed, consisting of casts and busts arranged around the walls, the mosaic from Carthage, the collection of coins and gems, the collection of Assyrian seals, and other objects installed in cases. The southeast alcove contains the Assyro Babylonian collection, including the temple tower, the serpent column of Delphi, the collection of Bibles and musical instruments, casts arranged upon the walls, statues, etc. Above both of these alcoves, casts of reliefs of the obelisk from Constantinople and a series of Hittite casts are exhibited. The southwest alcove contains objects of Brahmanism, Buddhism, and Shintoism, while the Græco-Roman, Jewish, and Mohammedan collections are installed in the northwest alcove.

LABELS.

During the year nearly 150 requisitions for printing labels and blanks were received from the various departments in the Museum.

There were printed on the Museum press 74,831 labels, representing eight hundred and three forms; 49,000 blanks, representing twenty-two forms; 6,047 circulars, representing twelve forms; and 6,090 copies, representing thirty-six forms, of other matter, making a total of 135,968 copies.

At the Government Printing Office there were printed upon requisition by the Museum 52,200 blanks and circulars, representing ten forms, and 31,772 labels, representing one hundred and eighty-one forms, making a total of 83,972 copies.

LIBRARY.

The librarian, Dr. Cyrus Adler, states that the accessions during the past year have been as follows: Periodicals, 5,542; books, 810; pamphlets, 1,209; total, 7,561. From the accessions to the library of the Smithsonian Institution there have been retained for the use of the Museum 7,596 periodicals, 333 books, and 1,047 pamphlets, making a total of 8,976. A list of the accessions to the Museum library by gift and exchange will be found in Appendix III.

The number of books borrowed during the year was 7,182, while 5,330 were returned, about 1,800 having been retained in the sectional libraries. Nearly 1,200 books were bound, of which, however, only about 200 belonged to the National Museum. Owing to lack of funds, it was impossible to have any more Museum books bound, although a large number require binding.

The transfer of the periodical record to the standard library record has been continued, the new record containing at the close of the fiscal year 4,300 cards. There are 6,000 cards in the standard catalogue of books other than periodicals.

It is the desire of the librarian to have the catalogue unified, but the pressure of current work has been so great that progress in this direction has necessarily been slow.

There has been no change in the number of sectional libraries since the last report, the list being as follows:

1. Administration.
2. Birds.
3. Botany.
4. Comparative anatomy.
5. Ethnology.
6. Fishes.
7. Geology.
8. Helminthology.
9. Historical collections.
10. Insects.
11. Mammals.
12. Marine invertebrates.
13. Materia medica.
14. Mesozoic fossils.
15. Mineralogy.
16. Mollusks.
17. Oriental antiquities and religious ceremonials.
18. Paleobotany.
19. Photography.
20. Prehistoric anthropology.
21. Reptiles.

CONTRIBUTIONS OF THE YEAR TO SCIENTIFIC LITERATURE.

A list of the papers based upon Museum material, which have been published during the year by officers of the Museum and other investigators, is printed in Appendix IV. Seventy-nine authors are represented. In the supplements to this bibliography will be found complete lists of the new genera and species described in the papers referred to. The following table shows the subjects to which these papers relate:

Subject.	By Museum officers.	By other investigators.	Total.
Administration	3		3
Anthropology	2		2
Archæology	4	1	5
Biography	1		1
Biology	1		1
Birds	45	21	66
Botany	13	18	31
Chemistry	2		2
Comparative anatomy	1		1
Ethnology	7	2	9
Exploration	3		3
Fishes	19	3	22
Fossils	10	2	12
Geology	4		4
Insects	32	18	50
Mammals	8	3	11
Marine invertebrates	2	4	6
Mineralogy	3		3
Mollusks	16	1	17
Oriental antiquities	1		1
Parasites	10		10
Religious ceremonial objects	1		1
Reptiles and batrachians	7		7
Taxidermy	1		1
Miscellaneous	4	1	5
Total	200	74	274

PUBLICATIONS.

The Report of the Museum for 1893 was published early in the year, and the papers in the appendix have appeared in separate form. The Report for 1894 is nearly all in type and much work has been accomplished in the preparation of the volume for 1895.

Volume XVII of the Proceedings was distributed in July, and active progress has been made in printing and distributing the separate papers in Volume XVIII. Nos. 1033 to 1082, with three exceptions, have appeared, and also paper No. 1032, belonging to Volume XVII, but not received from the press in time for distribution before the close of last year. Volume XVIII, in bound form, will probably be ready for distribution in the autumn. Advance sheets of the following papers have

been published: No. 1087, "Preliminary description of a new genus and two new species of Crustaceans from an artesian well at San Marcos, Tex.," by James E. Benedict; No. 1088, "Description of a new genus and species of Blind Tailed Batrachian from the subterranean waters of Texas," by Leonhard Stejneger; No. 1103, "Preliminary diagnoses of new mammals from the Mexican border of the United States," by Edgar A. Mearns. Manuscripts of fourteen additional papers to be published in the Proceedings were in the hands of the printer at the close of the fiscal year, and nineteen more have been accepted for publication.

The following additional parts of Bulletin 39 have been issued: Part H, "Directions for collecting minerals," by Wirt Tassin; Part I, "Directions for collecting rocks and for the preparation of thin sections," by George P. Merrill; Part J, "Directions for collecting specimens and information illustrating the aboriginal uses of plants," by Frederick V. Coville; Part K, "Directions for collecting and preparing fossils," by Charles Schuchert.

Circular 47, in regard to the identification of mollusks by the National Museum, has been issued.

The titles of all the papers which have appeared in the form of separates during the year are given in Appendix V.

Bulletin No. 47, "The Fishes of North and Middle America: A Descriptive Catalogue of the Species of Fish-like Vertebrates found in the Waters of North America North of the Isthmus of Panama," by David Starr Jordan and Barton Warren Evermann, a volume of 1,240 pages, is entirely in type and will be shortly put to press. The present Bulletin constitutes Part 1 of the work. A second volume of text and an atlas of plates will be published later.

Bulletin No. 49, "A Bibliography of the Published Writings of Philip Lutley Sclater, F. R. S., Secretary of the Zoological Society of London," prepared under the direction of Dr. G. Brown Goode, has been set in type. It contains 135 pages, with a portrait of Dr. Sclater as a frontispiece. Much care has been given to the typography, with a special view to securing compactness and clearness. This work is not included in the series of Bibliographies of American Naturalists, of which five have been published (Bulletins 20, 23, 30, 40, and 41), since the scope of this series is necessarily limited to the work of naturalists living in the United States; but, inasmuch as Dr. Sclater's contributions to the systematic ornithology of the American continent have exceeded in extent those of anyone living in this country, it was deemed proper that the U. S. National Museum should publish his bibliography.

It was hoped that the second and third numbers of the Special Bulletin, the first of which appeared in 1892, would be ready for distribution before the end of the year, but owing to certain unavoidable delays this was impossible. No. 2 of the series, entitled "Oceanic Ichthyology: A Treatise on the Deep-sea and Pelagic Fishes of the World, based

chiefly upon the collections made by the Steamers *Blake*, *Albatross*, and *Fish Hawk* in the Northwestern Atlantic," by George Brown Goode and Tarleton H. Bean, is an elaborate work of 553 pages, in quarto form, with an atlas of 417 figures arranged on 123 plates. The work of composition on Special Bulletin No. 3, which was partly put in type last year, has been completed, and the Bulletin is now ready for the press. This Bulletin constitutes the second volume of "The Life Histories of North American Birds," by Maj. Charles Bendire, and relates only to land birds, extending, in the classification given in the check-list of the American Ornithologists' Union, from the parrots to the grackles. The volume will contain 518 pages, and will be illustrated by seven chromo-lithographic plates of birds' eggs.

MATERIAL LENT FOR INVESTIGATION.

A number of specimens of the genus *Vespertilio* were sent to Mr. G. S. Miller, jr., of the Department of Agriculture, for use in connection with the preparation of a monograph of that genus. Three specimens of *Cuniculus* were also lent to Mr. Miller for illustration in a forthcoming paper on the voles and their allies. Over two hundred specimens of North American weasels were sent to Mr. Outram Bangs, Boston, Mass., for use in connection with a revision of the eastern weasels. Ten specimens of northern hares of the genus *Lepus* were transmitted to Mr. S. N. Rhoads, of the Academy of Natural Sciences of Philadelphia, for use in connection with a revision of the Arctic hares; also a number of skins and skulls of Old World hares, for the same purpose. Seven skulls of striped skunks were sent to Dr. E. A. Mearns, U. S. A., Fort Myer, Va.; one specimen of *Dendrohyrax* was transmitted to Dr. J. L. Wortman, American Museum of Natural History, New York City, for comparison with fossil remains, and eighteen specimens of weasels were sent to Mr. V. Bailey, of the Department of Agriculture, for use in a revision of North American weasels. A large collection of starfishes from the West Indies was sent to Prof. A. E. Verrill, Peabody Museum, New Haven, Conn., for study in connection with the preparation of a report upon the starfishes of that region; a specimen of amphipod (*Crangonyx flagellatus*, Benedict) was transmitted to the Rev. T. R. R. Stebbing, Tunbridge Wells, England, who desired to make a special study of the genus, and a small collection of crayfishes was sent to Dr. Walter Faxon, Museum of Comparative Zoology, Cambridge, Mass., who is preparing a report on the crayfishes added to the collection in the National Museum during recent years.

From the department of birds material has been sent out as follows: A skin of *Passerella iliaca megarhyncha* to Mr. F. Stephens, Witch Creek, Cal., for use in determining a new subspecies from that State; a skin of young Tern to Mr. George H. Mackay, 25 Congress street, Boston, Mass., for use in connection with the identification of some Terns

found on Muskeget Island, Massachusetts; forty-two specimens of Willow Warblers, from Asia, to Mr. William E. Brooks, Mount Morris, Ontario, for determination; seven skins of Night Hawks to Mr. George K. Cherrie, of the Field Columbian Museum, for use in determining a new form from Central America; three birds' skins to Stefan Chernel von Chernelháza, Köszeg, Hungary; twenty-six skins of *Xanthopygia* and forty-nine skins of Orioles to Mr. Witmer Stone, of the Academy of Natural Sciences of Philadelphia, for use in his studies of the molting of birds; seven skins of Sheerwaters (*Puffinus*) to Mr. L. M. Loomis, California Academy of Science; seven skins of Gyrfalcons and forty-two skins of Sanderlings to Mr. Frank M. Chapman, American Museum of Natural History, New York City, the former for use in the determination of specimens in the American Museum, and the latter to be used in a study of the change of plumage of that species; three skins of Asiatic birds to Mr. W. E. Brooks, Mount Forest, Ontario, and one skin of *Caprimulgus aldabrensis* to the Tring Museum, Tring, England.

A specimen of *Polistotrema dombeyi* was transmitted to Dr. Max Fürbringer, Jena, Germany, and a specimen of *Larimus breviceps* to Dr. C. H. Gilbert, Leland Stanford Junior University.

Specimens have been sent out from the department of insects for study or identification as follows: Material of the genera *Monedula* and *Gorytes* to Mr. William J. Fox, of the Academy of Natural Sciences of Philadelphia, for monographic study; the Japanese collection of Hemiptera to Prof. P. R. Uhler, Baltimore, Md., for identification; the collection of Crambidæ to Prof. C. H. Fernald, Amherst, Mass., for use in monographic work; the collection of Typhlocybini to Prof. C. P. Gillette, Fort Collins, Colo.; the collection of Lepidoptera obtained in East Africa by the Chanler-Höhnel expedition, to Dr. W. J. Holland, Allegheny, Pa., for study and report; thirteen species of Acridiidæ to Prof. J. McNeill, Fayetteville, Ark., for use in monographic work; fifty species of noctuids to Prof. J. B. Smith, New Brunswick, N. J., for study and identification; the collection in the genus *Apion* to Mr. C. H. Fall, Pomona, Cal.; certain species of Sessidæ to Mr. William Beutenmüller, American Museum of Natural History, New York City; a number of specimens of the genus *Prosopis* to Prof. T. D. A. Cockerell, Las Cruces, N. Mex.; a collection of Jassidæ to Prof. C. F. Baker, Fort Collins, Colo., for special study; a few species of diurnals to Dr. H. Skinner, Philadelphia, Pa., and a collection of Tryphonidæ to Prof. G. C. Davis, Agricultural College, Mich., for special study.

Specimens of Eocene fossils of the Midway or Clayton horizon were transmitted to Prof. G. D. Harris, of Cornell University.

From the department of botany there were sent to Mr. M. S. Bibb, Rockford, Ill., ninety-one specimens of *Salix;* to Prof. L. H. Bailey, Cornell University, a number of specimens of the genus *Carex*, from Idaho, for determination; to Prof. E. S. Burgess, Normal College, New York City, about two hundred specimens of Asters from the District of

Columbia; to Prof. William R. Dudley, Leland Stanford Junior University, a number of specimens for critical determination; to Prof. A. Engler, Berlin, Germany, three hundred and eighteen African plants for determination; to Prof. C. S. Sargent, Jamaica Plain, Mass., Coniferæ collected by the Mexican Boundary Commission, for determination; to Dr. John K. Small, Columbia University, New York City, material for use in connection with his work on the southern flora, and to Prof. William Trelease, Missouri Botanic Garden, St. Louis, a large number of specimens, including the entire collection of North American Celastraceæ.

Eocene echinoderms and a specimen of *Cidaris* were lent to Prof. W. B. Clark, of Johns Hopkins University, who has in preparation a work on American post-Paleozoic Echinoids. Six specimens, representing three species, of Cretaceous Gastropods were sent to M. Cossmann, for use in connection with a general revision of the Gastropods. Prof. Alpheus Hyatt received six species of Ammonites for examination, and about one hundred and fifty specimens of Blastoids were sent to Prof. Otto Jaekel, Berlin, Germany, for monographic work. Other paleontological material was sent out as follows: Four specimens of *Conchopeltis alternata* to Mr. E. O. Ulrich, Newport, Ky., for use in a revision of the Lower Silurian Gastropoda; ten lots of Foraminifera to Dr. Anthony Woodward, New York City, for determination; three species of Paleozoic Echinoids to Dr. Robert T. Jackson; one hundred and forty specimens of Paleozoic Cephalopods to Prof. John M. Clarke, Albany, N. Y., and specimens of fossil corals to Mr. H. S. Gane, Johns Hopkins University, Baltimore, Md.

Ethnological material has been lent to the Bureau of American Ethnology, for the purpose of preparing illustrations. Three stone adzes were transmitted to Mr. H. R. Bishop, New York City, and twelve specimens of aboriginal implements were sent to Miss Alice Fletcher, of this city, for use in illustrating a lecture before the Women's Anthropological Society.

About sixty thin sections of slates were lent to Prof. T. Nelson Dale, Williamstown, Mass.; twenty-five thin sections of Quincy granites to Mr. Theodore G. White, Columbia College, New York City; twenty-one thin sections and thirty-one specimens of Alaskan rocks to Mr. C. W. Purrington, United States Geological Survey, and fifty-five specimens of rocks from the Bear Paw Mountains to Mr. W. H. Weed, United States Geological Survey.

WORK OF STUDENTS AND INVESTIGATORS AT THE MUSEUM.

A number of students and investigators examined the collections in several departments of the Museum during the year, for the purpose of identifying specimens or of studying the characteristics of certain families or orders. A few of those who have availed themselves of this privilege are here mentioned.

Dr. E. A. Mearns, United States Army, continued his study of the interesting and valuable collection of mammals, obtained by himself and Mr. F. X. Holzner on the Mexican boundary, with a view to publishing an elaborate paper based upon this material. On account of the valuable service which he has rendered to the Museum he was accorded all of the privileges enjoyed by a regular curator in the prosecution of his work. Advance editions of two papers by Dr. Mearns have been published during the year, one of which is entitled "Preliminary diagnoses of new mammals from the Mexican border of the United States," and the other "Preliminary description of a new subgenus and six new species and subspecies of hares from the Mexican boundary of the United States."

In the department of birds Mr. D. G. Elliot, of the Field Columbian Museum, was engaged for a time in certain investigations; Mr. L. M. Loomis, of the California Academy of Sciences, studied various Pacific Coast species of Shearwaters, Gulls, and Horned Owls; Dr. Louis P. Bishop, New Haven, Conn., studied the Western Night Hawks, Bitterns, Horned Larks, Song Sparrows, etc., in connection with specimens which he collected in North Dakota; Mr. G. S. Miller, jr., of this city, made an examination of the Mexican Jays of the genus *Aphelosoma;* Mr. Witmer Stone, of the Academy of Natural Sciences of Philadelphia, inquired into the status of various Horned Owls; Mr. H. C. Oberholser, of the Department of Agriculture, made an investigation of the Downy Woodpeckers (*Dryobates pubescens* and subspecies) and arranged several families of neotropical Passeres in the study series; Mr. R. M. Anderson, Forest City, Iowa, spent two or three days in examining species of North American birds, and Mr. J. H. Riley and Mr. C. G. Rorebeck, Falls Church, Va., were occupied for several months in performing volunteer work and in familiarizing themselves with the birds of North America.

Although no one has been engaged in a regular course of study in the department of mollusks, many persons have been permitted to examine specimens in the study collection, and have received verbal information from the curator or his assistants. Dr. R. R. Gurley having been requested by the Hon. C. D. Walcott, Director of the United States Geological Survey, to prepare a monograph of the American Graptolites, all the facilities which the Museum affords in this direction were placed at his disposal. Prof. Alpheus Hyatt, Cambridge, Mass., spent some time at the Museum, in April, looking over the Paleozoic Cephalopoda, and Prof. H. F. Osborn, of the American Museum of Natural History, studied the skulls of *Titanotherium*.

Miss Etta Braly and Miss Amanda Braly were engaged for about two months comparing the insects collected by them in Arkansas with species in the Museum collection. The former had in view the preparation of a list of the Coleoptera found in that State, and the latter the preparation of a list of the Hemiptera.

Prof. E. L. Greene, of the Catholic University of America, made frequent visits to the herbarium for the purpose of conducting investigations in certain orders; Prof. C. F. Wheeler, of the Michigan Agricultural College, spent several weeks in the spring of 1896 studying the genus *Carex;* Dr. N. L. Britton, of Columbia College, New York City, was engaged in the herbarium about the same time in making critical observations on certain eastern species; Mr. C. S. Sargent, Jamaica Plain, Mass., examined the Coniferæ and Palmaceæ, and Mrs. E. G. Britton, of New York City, was engaged for about two weeks in May in the study of mosses, especially those from Alaska.

Dr. Theodore Gill has had access to the collections of fishes while prosecuting his work upon the families and their relationship. Prof B. W. Evermann, of the United States Fish Commission, has examined the collections in the same department in connection with his work upon material recently collected by the Commission, and also in connection with the preparation of Bulletin 47 of the United States National Museum entitled "The Fishes of North and Middle America," by David S. Jordan and B. W. Evermann. This work was nearly all in type at the close of the fiscal year. Prof. A. E. Verrill, New Haven, Conn., who is engaged in the preparation of a report on the West Indian starfishes, spent about a week in the laboratory of the department of marine invertebrates, during which time he identified a large number of specimens, and selected others which he desired to have sent to him for more critical examination.

Dr. W. F. Hillebrand, of the United States Geological Survey, was engaged for a time in an investigation of the fluorescence of wollastonite, and Prof. R. L. Packard has continued to make use of the collections in the department of geology.

Dr. W. J. Hoffman of this city has prepared for publication a paper on the "Graphic Art of the Eskimos," the work being based upon a study of the collections in the Museum. Mr. J. D. McGuire, Ellicott City, Md., who published a paper in the Report for 1894, entitled "Primitive Methods of Drilling," has been engaged during the present fiscal year in the study of the pipes used by the American aborigines, with a view to the preparation of a paper on that subject. Dr. J. Hampden Porter has in course of preparation a paper on the foods of primitive people, and has made use of the Museum collection in this connection. Mr. H. A. Hazen of this city was granted the privilege of examining the collection of kites. Dr. J. Walter Fewkes was engaged during the winter in the preparation of an illustrated catalogue of the material collected by him in Arizona during the previous summer.

VISITORS.

The following table shows the number of visitors to the Museum and Smithsonian buildings for each month of the fiscal year ending June 30, 1896:

Year and month.	Museum building.	Smithsonian building.
1895.		
July	17,516	9,336
August	15,685	8,053
September	18,223	10,130
October	14,066	10,280
November	12,320	6,763
December	13,150	7,346
1896.		
January	10,063	6,407
February	16,064	8,519
March	16,771	8,132
April	21,457	12,713
May	15,443	10,070
June	9,747	5,901
Total	180,505	103,650
Approximate daily average on a basis of 313 days in the year	577	331

Number of visitors to the Museum and Smithsonian buildings since the opening of the former in 1881.

Year.	Museum building.	Smithsonian building.	Total to both buildings.
1881	150,000	100,000	250,000
1882	167,455	152,744	320,199
1883	202,188	104,823	307,011
1884 (half year)	97,661	45,565	143,226
1884–85[1]	205,026	105,993	311,019
1885–86	174,225	88,960	263,185
1886–87	216,562	98,552	315,114
1887–88	249,665	102,863	352,528
1888–89[1]	374,843	149,618	524,461
1889–90	274,324	120,894	395,218
1890–91	286,426	111,669	398,095
1891–92	269,825	114,817	384,642
1892–93[1]	319,930	174,188	494,118
1893–94	195,748	103,910	299,658
1894–95	201,744	105,658	307,402
1895–96	180,505	103,650	284,155
Total	3,566,127	1,783,904	5,350,031

[1] Years of Presidential inaugurations.

MATERIAL RECEIVED FOR EXAMINATION AND REPORT.

There have been 542 lots of material of various kinds received during the year for identification. These were included between Nos. 3236 and 3777, and represent an increase of 75 over the receipts of the preceding fiscal year. A detailed list of these sendings, arranged alphabetically by the names of the persons transmitting the material, is printed in Appendix VI.

MEETINGS OF ASSOCIATIONS IN WASHINGTON DURING THE YEAR.

On September 5, 1895, the Society of Agricultural Chemists met in the lecture hall of the Museum. The sessions extended over three days.

The American Ornithologists' Union met on November 12 and held three sessions on that day and the day following.

The eleventh annual meeting of the American Historical Association was held in Washington on December 26 and 27.[1]

On January 2, 1896, the second annual meeting of the National Science Club opened.[1]

A lecture was delivered in the office of the Assistant Secretary, on March 16, by Rear Admiral S. Makaroff, of the Russian Navy, on "The specific gravity of the waters of the North Pacific Ocean."

The National Academy of Sciences has for some years held its annual meeting in the Museum building. The sessions for the present year lasted from April 21 to 24. The business meetings were held in one of the offices and the lecture hall was used for the public meetings.[1]

A lecture to the pupils of the High School of Washington on "India" was delivered in the lecture hall of the Museum on May 22 by Mr. H. N. Wilson.

The Saturday lectures were continued during the season of 1896 under the auspices of the joint commission of the scientific societies of Washington. The subjects of these lectures are given in Appendix VII. Many of the lectures were illustrated by the stereopticon, and others by maps, diagrams, and specimens. The series delivered during this year was arranged with a view to illustrating the relations of life to environment. Two courses were provided, the first pertaining chiefly to vegetal and animal life, the second to human life in its relations to lower organisms and to the inorganic world. The five lectures constituting the second course were printed in the Appendix to the Report of the Smithsonian Institution for 1895.

[1] A list of the papers submitted is printed in Appendix VII.

The following table indicates the number and dates of Saturday lectures since 1882:

Year.	Date of first and last lecture.	Number of lectures.
1882	March 11, April 29	8
1883	January 13, March 31	12
1884	January 5, April 26	17
1885	February 7, May 2	12
1886	March 6, May 8	10
1887	March 12, May 7	12
1888	February 18, May 5	12
1889	March 9, May 11	10
1890	February 1, April 3	10
1891		
1892		
1893	March 25, May 13	8
1894	February 17, May 26	15
1895	February 23, April 27	10
1896	March 21, May 23	10
Total		146

CIVIL SERVICE.

Under an order issued by the President on May 6, 1896, the National Museum was made subject to the law regulating appointments and promotions in the civil service of the United States.

NEW MUSEUM BUILDING.

On December 10, 1895, Senator Morrill introduced a bill for the erection of an additional building for the use of the National Museum. This bill was referred to the Committee on Public Buildings and Grounds, and favorably reported on February 27, 1896. An amendment embodying the substance of the bill was afterwards made to the Sundry Civil bill, but was not retained.

COTTON STATES AND INTERNATIONAL EXPOSITION.

The Cotton States and International Exposition at Atlanta, Ga., opened on September 18 and closed on December 31, 1895. The Assistant Secretary represented the Smithsonian Institution and the National Museum on the Government board of management. Mr. R. E. Earll was appointed special agent in charge of the exhibit.

The following departments and sections in the Museum prepared exhibits for this Expostion: Mammals, birds, reptiles, fishes, comparative anatomy, marine invertebrates, mollusks, insects, paleontology, geology, minerals, botany, ethnology, prehistoric anthropology, materia medica, technology, oriental antiquities, and religious ceremonials Collections of musical instruments and of ceramics were also exhibited.

The official report upon the participation of the Smithsonian Institution and the National Museum in the Exposition will be found in the Report of the Smithsonian Institution for 1896.

NECROLOGY.

Prof. Charles Valentine Riley, honorary curator of the department of insects in the United States National Museum, died September 14, 1895.

The following is an extract from a biographical sketch by the Assistant Secretary, read at the annual meeting of the Joint Commission of the Scientific Societies of Washington, January 18, 1896, and afterwards published in Science:[1]

Professor Riley was born in Chelsea, London, September 18, 1843. His schoolboy days were passed in France and Germany, and he was but 17 when his restless spirit led him to America.

"He went West and settled with Mr. G. H. Edwards, whom he had met in London and who had made arrangements to open a stock farm in Kankakee County, Ill. Here, during three years, he acquired that experience of Western agriculture that can be gained only by farm work. Fond of all life as manifested on the farm, young Riley devoted himself enthusiastically to the calling he had chosen. Of an inquiring and experimental turn of mind, he aimed to improve on the methods in vogue, and soon won the esteem of all who knew him; and, though so young, was sought for in counsel and honored at public gatherings, at which he became intimate with Emory Cobb and other prominent farmers of Illinois. Under these circumstances, and with a deep love of nature in all her manifestations, it was no wonder that Professor Riley, as we have heard him avow, looked back to the farming days in Illinois as the happiest of his life.

"The experience gained on the farm enabled him, more than anything else, to understand the position and needs of the farmer. In writing of Professor Riley's farm life and the reasons why he abandoned it, a Kankakee friend who knew him well remarks: 'Young Riley was simply too enthusiastic and too bent on excelling in everything. He took no rest. Often he would be up, actually getting breakfast ready, to relieve the women folk, and milk half a dozen cows, before the others were about. When others were resting at noon in the shade, he would be working at his flowers under a July sun. There was not a sick animal of the three hundred on the place that he did not understand and help. He kept a lot of bees, got hold of the best bred colts, and some of the best heifers in the county, secured a good quarter-section, and spent his Sundays reading, sketching, and studying insects. Three years of this unceasing effort under the trying climatic extremes of central Illinois broke the young fellow's health, for it was a great contrast to his previous life, and with every one telling him that he was wasting his talents, he finally concluded to give up the idea of farming. But had his health not failed him, my opinion is that he would be a farmer to-day, and a successful one too, for he has intense love of rural life.'

"He went to Chicago in his twentieth year, with no definite trade or profession and with little experience of city life. Money was scarce among farmers in those days, and his little property was so invested that it was not available. The trials of his first few months in Chicago are familiar to only a few of his intimate friends, but the manner in which he overcame them while yet in poor health was characteristic. Pride prevented him from asking help from his Kankakee friends, but did not prevent him from donning blue overalls and doing manual labor in a pork-packing establishment, or from adding to his slender income by making portraits of fellow boarders, or sketches which he himself disposed of at evening in the abodes of wealth on Michigan avenue. After a while he obtained an engagement as a reporter on the Evening Journal, but finally became connected with the Prairie

[1] Vol. III (N. S.), No. 59, 1896, pp. 1–8.

Farmer, then the leading agricultural paper of the West. Besides a close application to the duties of his position as reporter, delineator, and editor of the entomological department of this paper, he devoted his time and energies to the study of botany and entomology. His industry and versatility soon made him not only popular with his associates upon the paper, but gave him a widespread reputation as a writer upon natural history, especially on his specialty of economic entomology, the importance of which he soon made apparent."[1]

His adventurous temperament led him to enlist as a private in the One hundred and thirty-fourth Illinois Volunteers, in which he served for several months during the civil war, in Kentucky and Tennessee.

Before entering the army he had made the acquaintance of the man whom he joined in 1868 in establishing the American Entomologist. This friend, who was senior editor until his death, was Dr. Benjamin D. Walsh, State Entomologist of Illinois, and it was Walsh to whom Riley always alluded as his master and the man to whom he was most indebted for his early training and inspiration. Mr. Walsh was a graduate of the University of Cambridge, in the class with Darwin, a man of weight and scholarly attainments and a most careful and painstaking investigator. During the few years of his residence in Illinois he had done much to develop the interest in economic entomology, which resulted in the establishment of the position of State Entomologist of Missouri in 1868, which was the beginning of Riley's public labors.

An important outgrowth of Riley's personal activity in connection with his official work was the formation of the Riley collection of insects, upon which he began immediately after he left the army in 1864, and which at the end of twenty-five years included over 20,000 species and over 115,000 mounted specimens, besides much other material. The collection is in many respects unique, especially so because of the complete manner in which the life-history of numerous individual species is represented. It is the legitimate outgrowth and complement of Riley's investigations, and is a voucher for the accuracy and fullness of his personal work in entomology. This collection he gave in 1882, without condition, to the National Museum, at that time without a collection of insects. His purpose in doing this was to place in the Museum a worthy nucleus, and to be instrumental in the formation of a collection which would be worthy of the nation. He was appointed at once honorary curator of the department of insects in the Museum, and gave much attention to the department, which thereafter made rapid advances.

It was as an economic entomologist that Riley was most widely famed. In this field he was eminent in two respects—in administration as well as in his direct contributions to the science of practical entomology, and to the art which is its outgrowth.

As an administrator, he was associated with three prominent undertakings: The entomological work of the State of Missouri, the United States Entomological Commission, and the establishment of the Division of Entomology of the Department of Agriculture.

He held the position of entomologist to the State of Missouri for nearly ten years, entering upon this work at the age of 23.

The United States Entomological Commission was in existence for five years, Riley having been its chief from the beginning.

"We all remember," said the Pacific Rural Press in 1887, "the sad experiences which our Western States and Territories passed through from 1873 to 1877, from locust or grasshopper ravages, which resulted in destitution and precipitated a financial crisis. These ravages seriously affected the western portion of his own State, and Professor Riley took hold of the problem with that originality and vigor which have characterized all of his work. His last three reports to the State contain the first positive and accurate knowledge on the subject that has been published.

[1] Colman's Rural World, St. Louis, May 12, 1892.

But he early saw that the subject was one of national importance and could not be fully dealt with by work in any one State. To feel a necessity was sufficient for him to act, and consequently we find him, in public lectures, in leading articles, through resolutions offered at societies' meetings, memorials to Congress, and in every other way urging the creation of a National Entomological Commission. After various bills had been introduced and discussed, Congress finally created the Entomological Commission, with a special view to investigating the Rocky Mountain Locust, or so-called grasshopper, and Professor Riley was tendered the position as chief of the Commission, a distinction which his investigations into this insect had justly earned, for he had already not only made most important discoveries as to its habits and the best means of subduing it, but had ascertained sundry laws that govern it, so as to be able to predict the time of its coming and going and the limits of its spread. Consulted by Secretary Schurz as to the other appointments, it is no wonder that the members chosen were Dr. A. S. Packard, jr., a naturalist of eminence, one of the finest entomologists of the world, and a prominent author and editor, and Prof. Cyrus Thomas, who had likewise labored for the creation of the Commission, and who was the authority on the family of insects to which the locusts belonged. Both of these gentlemen, like Professor Riley, had been chosen by their respective States as official entomologists, and had a large personal experience in the West. Accepting charge of the Commission thus constituted in March, 1877, we find Riley traveling that year over most of the western country, from the Gulf to the South Saskatchawan, in British America, now in company with the governor of the State, and again with other special officials, but everywhere exhorting the farmers to action, making careful observations and experiments, and inspiring confidence."

He was the first to demonstrate the practicability of checking the ravages of an important species of insect by enlisting the aid of the insect enemies which had kept it in check in its native habitat. This was effected by the introduction from Australia in 1888, at his instance and by two agents sent out from his office, of the Australian *Vedalia*, a species of lady-bird, which is the natural enemy of the "Fluted Scale," an insect which had found its way from southern Australia to California, and was fast destroying the orange and lemon groves.

His studies in connection with *Phylloxera*, the French vine pest, although not more important than many others more purely American in interest, may well be referred to on account of the attention which they attracted in France, and the honors conferred upon him as a result. To him is generally attributed the idea of reviving etiolated French vineyards by using certain American Phylloxera-proof stocks to graft upon.

As long ago as 1873 the vine growers of France presented him with a gold medal, struck in recognition of his investigations into the history of the *Phylloxera*. In 1889, as a further proof of their appreciation of his services, they presented to him a beautiful statue in bronze, while the French Government conferred upon him the cross of the Legion of Honor.

Associated prominently with his name are certain practical methods for the destruction of insects: the use of kerosene emulsions to protect plants and trees from the attacks of suctorial insects, and the invention and perfection, aided by Mr. W. S. Barnard, of a very ingenious series of mechanical devices for spraying insecticides and fungicides in a liquid form—often called the Riley system.

The vast amount of work which Professor Riley accomplished is shown by the catalogue of his published papers, of which there are more than 1,600, many of them of very considerable extent, and the whole equivalent to at least 20,000 octavo pages.

Professor Riley bequeathed to the United States National Museum, through a trustee, all entomological and other natural history specimens which had come into his possession during recent years. A large collection of his pamphlets, relating to the subject of entomology, has been deposited in the Museum by Mrs. Riley.

Mr. R. S. Matthews, aid in the department of mammals, died on on November 13, 1895, in Atlanta, Ga., where he had been detailed for duty in connection with the Cotton States and International Exposition. Although Mr. Matthews had been connected with the Museum only a short time, he had shown marked ability, and would have undoubtedly become a naturalist of prominence.

Mr. R. Edward Earll, editor of the Proceedings and Bulletins, died on March 19, 1896. The following brief account of his life, prepared by the Assistant Secretary, is reprinted from Science:[1]

Mr. Robert Edward Earll, who died on March 19, at Chevy Chase, near Washington, was one of the oldest and most trusted members of the staff of the Smithsonian Institution, with which he had been connected in various capacities since 1877. He was born at Waukegan, Ill., August 24, 1853, educated in the Waukegan public schools, the University of Chicago, and at the Northwestern University, where he was graduated in 1877 with the degree of B. S. He entered the service of the Fish Commission, under Professor Baird, as a fish culturist; in 1878 was transferred to the scientific staff, and from 1879 to 1882 was engaged in the fisheries division of the Tenth Census.

From 1885 to 1888 he was chief of the division of statistics in the Fish Commission. He was sent in 1883 to the International Fisheries Exhibition in London, as a member of the staff of the United States Commissioner, and rendered very efficient service as executive officer and deputy representative. His aptitude for exposition work was so fully demonstrated on this occasion that he has been designated chief executive officer at all the expositions which have since been held, for the exhibits of the Smithsonian Institution and the National Museum—at Louisville and New Orleans in 1884 and 1885, Cincinnati in 1888, Chicago, in 1893, and Atlanta in 1895. At the time of his death he had just completed the unpacking of the exhibits returned from the South.

Since 1888 he had been connected with the National Museum, with the grade of curator, and for three years had been editor of the Proceedings and Bulletins of the Museum.

He was recognized by his associates as a man of fine administrative ability, which, combined with great force of character, had brought him into the position of one of the most efficient exposition experts living. His unselfish devotion to his work and his absolute trustworthiness were appreciated by all who knew him, and he was exceedingly popular among his associates.

Notwithstanding his constant occupation in executive work, he produced and published a considerable number of important papers in regard to the methods of the fisheries and the habits of fishes. He was one of the best authorities upon the natural history of the shad and herring, and made exhaustive studies of the fishery statistics of the Atlantic and Gulf coasts and of the Great Lakes. Several new fishes were discovered by him, one of which, an important food species of the southern coast, obtained by him at Charleston in 1881, is called in his honor Earll's hake, *Phycis earlii*. He was also a skillful fish culturist, and had much experience in the early experimental work in the propagation of the shad and in the establishment of the cod hatching station at Gloucester.

He was a man of the purest personal character. His loss will be deeply felt by many in Washington. By reason of his peculiar abilities and his great experience, his death creates a void which it will be practically impossible to fill.

[1] Vol. III (N. S.), No. 65, 1896, p. 171.

III.—REVIEW OF WORK IN THE SCIENTIFIC DEPARTMENTS.

During the early part of the fiscal year the curators of many of the departments were engaged in completing the preparation of their exhibits for the Cotton States and International Exposition at Atlanta, Ga. This Exposition opened on September 18 and continued until the close of the year 1895. Another month or more was required for the return of the exhibits and their installation in the Museum, so that for at least one-half of the period covered by the present report the curators were occupied more or less with Exposition matters. This is usually the case, however, during those years in which Expositions occur, and as the resulting disadvantages have been dwelt upon in previous reports, no extended reference to them need be made at this time. Nevertheless, it is gratifying to state that satisfactory progress has been made in all the departments, notwithstanding the difficulties encountered. The record of the present year compares favorably with that of other years in which similar conditions existed.

DEPARTMENT OF MAMMALS.

As stated in the last Annual Report, the curator, Mr. F. W. True, was detailed in May, 1895, to accompany an expedition to Alaska and the adjacent islands for the purpose of studying the seal rookeries. While thus engaged he was attached to the staff of the United States Fish Commission.

The most interesting accessions to the collections of this department have been received from Dr. W. L. Abbott, who for several years has forwarded very large and valuable collections of mammals, birds, etc., from various parts of Africa and Asia. His contributions in the present year consisted of valuable skins of lemurs and other small mammals from Madagascar, and a collection from Kashmir, including a stag and a musk. In all, ninety-two specimens were received from him.

About forty skins of the very rare mole *Neürotrichus gibbsii*, from British Columbia, were purchased by the Museum. Eighty-eight mammals from the Pribilof Islands, including fifteen fur-seals, were collected by the curator (while in the service of the Fish Commission) and Mr. D. W. Prentiss, jr. A mounted skin of the Chile deer, *Cariacus chilensis*, was presented by the La Plata Museum. Lieut. Wirt Robinson, U. S. A., collected fourteen small mammals in Margarita Island and La Guayra, Venezuela. These he kindly presented to the National

Museum. About fifty mammals, which died from the effects of confinement in the National Zoological Park, have been received. They were chiefly representatives of North American species. From Dr. E. A. Mearns, U. S. A., were received several small mammals from Fort Clark, Tex., and Fort Myer, Va., and Prof. R. E. Call donated between three and four hundred bats, which he obtained from the Mammoth Cave in Kentucky.

Mr. True states that, while the accumulations of the year included some very valuable specimens, so far as scientific value is concerned, the general average is probably below that of the last three or four years. The number of specimens received is also less. There were fifty different contributors, four of which were Government Bureaus. The total number of specimens received and entered was 1,048, including 365 bats of one or two species only.

Very little work was accomplished in the exhibition hall, owing to the absence of the curator. A considerable number of specimens were withdrawn for exhibition at the Cotton States and International Exposition at Atlanta, but these were returned before the expiration of the fiscal year.

Regarding the study collections the curator says:

> The study series has not degenerated, so far as I am aware. A large number of skins have been taken from the vats and made up dry, and many old but valuable skins have been made over. From the want of an assistant, little has been done towards classifying and putting away the larger skins.
>
> There are still many skins of the larger species which are in very bad form for study purposes and ought to be made over, so that they can be handled. At present they are stored in boxes.
>
> New cases were provided in the third-story laboratory, but little has yet been put into them.
>
> Some progress was made in transferring the valuable study series of small skulls from trays to boxes, but more remains to be done.
>
> The alcoholics have been looked after and roughly classified in the alcohol room, but the lack of an assistant made it impossible to do much in that direction.

A paper entitled "Revision of the American Moles," by the curator, was completed and sent to press during the year. He has also continued his work on the "Antlers of the Deer Family," although this has been constantly interrupted by special assignment to executive duties.

The curator calls attention in his report to several explorations which have resulted in the acquisition of some very desirable material. Thus, Mr. D. W. Prentiss, jr., was detailed to accompany the curator to the Pribilof Islands, Alaska, in the summer of 1895, and in the three months spent there they collected eighty-eight mammals, a large number of plants, some anatomical specimens, insects, birds, and other natural-history objects. Among the mammals are fifteen fur-seals of varying ages, including a very fine old bull. Dr. W. L. Abbott, who has continued his travels in Kashmir, sent some very interesting mammals to the Museum from that country. He also made a collecting trip in southeastern Madagascar, and as a result a splendid series of skins of

lemurs and of the insectivores peculiar to that island were added to the Museum collections. Prof. R. E. Call explored the caves of Kentucky and obtained in the Mammoth Cave a large number of bats for the Museum. Mr. William Palmer made an expedition to the Dismal Swamp, Virginia, and collected a few mammals.

It is pleasant to refer here to the enthusiastic cooperation of Dr. E. A. Mearns, U. S. A. Both in the field and in the laboratory his energies and intelligent aid have been of very great value to the Museum.

Three papers based upon collections made by Dr. Mearns and Mr. F. X. Holzner have been published by the Museum. These contain descriptions of eighteen new species and subspecies.

The curator thus outlines the general course which it seems desirable to follow in the future in connection with the development of this department:

> The collections of mammals made by the Department of Agriculture in the last few years being cited in the publications of that Department as belonging to the National Museum, it is taken for granted that they do now and always will form a part of the Government collections of the Museum. Such being the case, it seems inadvisable to spend money in procuring North American mammals at this time, except of such species as are not collected by the Department of Agriculture or of which specimens are needed for exhibition purposes.
>
> On the other hand, all kinds of foreign mammals are greatly to be desired. The tendency of work in America at present is to follow broader lines than hitherto, and the foreign species are needed for comparison with our own.
>
> We ought to be on the lookout, furthermore, to secure specimens of large foreign species which are threatened with extinction. Some which were obtainable twenty-five years ago are no longer to be had.

Additions to the groups of North American mammals are in view, but there is great discouragement in this direction, it being impossible at the present time to find exhibition space for five groups already prepared. A fur-seal group is now being provided for.

Mr. True, in addition to his duties as curator of mammals, has served during the year as chairman of the Committee on Publications, and has frequently been called upon to act as Executive Curator in matters affecting the general administration of the Museum.

The department suffered a severe loss in the death of Mr. R. S. Matthews, which occurred on November 13, 1895.

The appended statement shows the number of specimens in the collection and the number of catalogue entries made during the year:

Specimens.

Total number of specimens in the collection June 30, 1895		14,432
Received during the fiscal year 1895–96	1,048	
Distributed during the fiscal year 1895–96	265	
Increase, fiscal year 1895–96		783
Total number of specimens in the collection June 30, 1896		15,215

Catalogue entries.

Skins, alcoholics, and skulls:	
Last entry, June 26, 1895	62479
Last entry, June 17, 1896	63475
New volume—	
First entry, April 27, 1896	82301
Last entry, June 27, 1896	82674
Department of Agriculture deposit:	
Last entry, June 27, 1895	72200
Last entry, June 29, 1896	78473

DEPARTMENT OF BIRDS.

During the year just closed a large proportion of the time of the curator, Mr. Robert Ridgway, has been devoted to the prosecution of his work on the "Birds of North and Middle America." In a special report regarding the progress of this work he makes the following statement:

There have been completed during the year the synonymy, family diagnoses, and concomitant matter pertaining to 54 families, 335 genera, and 1,061 species. During the preceding period since the work was commenced 15 families, 165 genera, and 747 species were covered.

This statement does not by any means show the proportion of the work which has actually been completed, since a large number of genera and individual species, thoroughly "worked up" in other connections, are in shape for the printer. How many and what proportion of the whole these would represent, it is, however, impossible to estimate.

At the present rate of progress the synonymatic portion of the work will be completed by December, 1896—possibly sooner. Much of the most difficult portion of the task will then be out of the way. In the meantime a determined effort will be made to thoroughly rearrange the collection, so as to facilitate access to the specimens, and then the finishing touches will be given the work without unnecessary delay.

Other investigations carried on by the curator included a study of the genera of the Tringillidæ; a study of the affinities of *Procnias viridis;* a partial compilation of a list of type specimens in the department of birds; determinations of some Galapagos species, of a species of *Peucedramus* from Guatemala, and of a species of *Geothlypis* from Mexico. He also prepared a paper on the birds collected by Dr. W. L. Abbott in the Seychelles and other islands near Madagascar. The curator was detailed for two months in southern Florida, for the purpose of studying the bird life of that region.

The routine work has devolved very largely on Mr. Charles W. Richmond, assistant curator. The latter has determined collections of birds made by Dr. W. L. Abbott in Kashmir, in eastern Turkestan, and in Madagascar. He has also commenced the study of a collection of birds from East Africa, a collection of birds from Margarita Island, Venezuela, made by Lieut. Wirt Robinson, and a series from eastern Mexico.

The number of specimens received during the year was about 3,000

in excess of the receipts for the preceding year, the number of accessions or "lots" of material having been eighty-six. The scientific value of the accessions for the year just closed exceeded that for the year 1894–95, including, as they did, a rare and extinct parrot (*Nestor productus*), presented by Dr. W. L. Ralph; one species doubtfully extinct, many types of new species, and a number of rare specimens. Specimens or collections of unusual importance have been received from more than forty individuals and establishments during the year. The list of important contributors for the preceding year was headed by Mr. A. Boucard, Isle of Wight, England. He has been a very generous contributor, having presented during this year more than 2,800 specimens from various parts of the world. His liberality toward the Museum is very highly appreciated.

Among other important accessions the following may be mentioned: From Dr. W. L. Abbott, 217 specimens, representing 83 species, from Madagascar, and 67 specimens, mainly eagles and hawks, from Kashmir (gift); Lieut. Wirt Robinson, United States Army, 167 specimens from Margarita Island, Venezuela, and Bogota, Colombia, including types of 11 species (gift); Rev. H. T. Heyde, 1404 Erato street, New Orleans, La., 183 bird skins from Central America (purchase); H. P. Attwater, San Antonio, Tex., 367 specimens from Texas (purchase); Dr. A. Fényes, Hélouan, Egypt, 79 specimens from Egypt (gift); 190 birds collected by Robert Ridgway, in Florida and other States, for the U. S. National Museum; S. Dannefaerd, New Zealand, 9 specimens from Chatham and Snares Islands (purchase); F. Stephens, Witch Creek, Cal., type of *Speotyto cunicularia obscura* (gift); William Brewster, Cambridge, Mass., 141 specimens from Mexico and Lower California (gift); Charles E. Kern, Washington, D. C., 85 specimens from Costa Rica and Nicaragua (gift); F. W. True, U. S. National Museum, and D. W. Prentiss, jr., Washington, D. C., 142 specimens collected in Alaska; Richard C. McGregor, Palo Alto, Cal., 119 birds from California and Colorado.

The material received during the year has been catalogued and distributed in the various series of the collection, and a considerable number of unidentified species have been determined. Mr. J. H. Riley, of Falls Church, Va., gave his services gratuitously for about six months, during which time valuable assistance was rendered in the matter of cataloguing. Mr. H. C. Oberholser, of the Department of Agriculture, has been engaged for a year or more in rearranging the neotropical series, and several families of Passeres have received attention. This work is also done gratuitously, and has been performed outside of office hours.

Mr. Ridgway states that a large amount of incidental work has been performed, such as furnishing information of a technical character in response to requests received through the mail; the preparation of a card catalogue of the sectional library; the preparation of data relating to the type material in the department, and the reading of proof

and the verification of references in the Bibliography of Dr. P. L. Sclater, which will shortly be published by the Museum as No. 49 of the Bulletin.

A number of additional cases for the storage of specimens have been provided. Several of these cases will be placed in the west basement, and the remainder in the gallery. The extensive additions to the collections during the last two or three years have rendered an entire rearrangement necessary. Such a readjustment is made the more urgent by the fact that the collections in the west basement are more or less inaccessible, and to some extent exposed to the ravages of insects. That portion of the study series which is installed in the bird gallery is in good condition.

The material exhibited at the Cotton States and International Exposition at Atlanta was returned and placed in position during the year.

Mr. Richmond made a collecting trip to Smiths Island, Va., and Mr. William Palmer, chief taxidermist, collected birds in Florida. Explorations resulting in additions to the collections have also been undertaken by twenty-four other persons, the names of some of them having already been mentioned in this review. The names of the others will be found in the accession list (Appendix II).

Material for investigation has been sent to thirteen different individuals and establishments, and eight persons not connected with the Museum have visited the building and made use of the collections.

Thirty-six papers based upon material in this department have been published during the year by the curator, assistant curator, and other collaborators. In these papers one new family, four new genera, and thirty-four new species and subspecies are described.

The number of specimens received, including those added to the Department of Agriculture collection, was 8,488. This is the first year in which any large number of specimens from the Department of Agriculture have been entered. Although the material is the property of the Museum, it is, as a matter of convenience, installed and catalogued separately for the present. The total number of specimens in the collection is now over 86,000. The addition of the duplicates would bring the figures up to about 100,000.

The catalogue entries for the year were as follows:

	Last entry June, 1895.	Last entry June, 1896.
Regular catalogue	150721	152825
Department of Agriculture catalogue	136130	139687
Catalogue of the Boucard collection	146766	149593

DEPARTMENT OF BIRDS' EGGS.

The honorary curator of this department, Maj. Charles Bendire, states that the number of accessions was slightly less than during the preceding year, but that the scientific value of the material received

during both years was about equal. The largest accession was from Dr. W. L. Ralph, Utica, N. Y., who has long been regarded as one of the most valued contributors to the Museum. This collection consisted of 88 nests and 911 eggs, representing 206 species. Other important contributions were received from the following: Dr. James C. Merrill, United States Army, Fort Sherman, Idaho, 6 nests and 99 eggs, representing 12 species; Lieut. Wirt Robinson, United States Army, Cambridge, Mass., 5 nests and 65 eggs, representing 14 species; United States Fish Commission steamer *Albatross*, through Mr. F. W. True and D. W. Prentiss, jr., 35 specimens, representing 10 species; Elmer J. Judd, Cando, N. Dak., 25 eggs, representing 3 species; United States Department of Agriculture, 32 specimens, representing 8 species. Twenty-eight eggs and 6 nests were purchased from Mr. H. P. Attwater, San Antonio, Tex.

All of the material received has been properly catalogued and labeled, and the exhibition and study series are in excellent condition. It would be very desirable to increase the former if the necessary space were available.

The honorary curator mentions the names of thirty-five persons whose cooperation has resulted in enriching the collections. The Department of Agriculture and the United States Fish Commission have also made valuable contributions to the collections of this department.

The number of eggs received during the year was 1,729, and of nests 154. The last catalogue entry in June, 1895, was 27655, and in June, 1896, 28138.

DEPARTMENT OF REPTILES AND BATRACHIANS.

As stated in the last annual report, the curator of this department, Dr. Leonhard Stejneger, was detailed in the spring of 1895 to accompany a Government expedition to Alaska and the adjacent islands for the purpose of studying the seal rookeries. Dr. Stejneger was absent for a considerable portion of the fiscal year covered by the present report, and in June, 1896, he again left for the north, having been appointed by the President a member of a special commission, authorized by joint resolution of Congress, to investigate the condition of the seal herds. For these reasons the regular operations of the department of reptiles and batrachians have been considerably interfered with.

The number of specimens received and entered on the catalogue has been smaller than during the preceding fiscal year, although this is partially accounted for by the fact that the year last referred to was one of unusual activity. The scientific value of the material is no less in proportion than that attaching to the accessions of the previous year, some very interesting collections having been received from South America and Madagascar, as well as from various parts of the United States. Eight specimens of a blind batrachian from an artesian well

at San Marcos, Tex., were received from the United States Fish Commission. They represent a new genus and species, described by Dr. Stejneger as *Typhlomolge rathbuni*. This is regarded as one of the most remarkable herpetological discoveries of recent years. Other accessions by gift included one from Dr. W. L. Abbott, consisting of a series of reptiles collected by him in Madagascar, and one from Lieut. Wirt Robinson, United States Army, consisting of a collection of reptiles and batrachians from La Guayra and Margarita Island. A series of reptiles and batrachians from Argentina was received from the Museo de la Plata, in exchange.

The curator's visit to the islands in Bering Sea yielded very little in the way of collections for this department, owing to the absence of batrachians and reptiles in the localities visited. A specimen of a rare salamander (*Salamandrella wossessenskii*) was, however, obtained in Kamchatka. It is the only species occurring there, and had not been previously represented in the Museum collection. Mr. F. W. True secured some specimens of snakes and toads on Vancouver Island, and an interesting collection of snakes from the Dismal Swamp, Virginia, was obtained by Mr. William Palmer of the National Museum.

Regarding the condition of the various series in the department, the curator says:

> The collection was gone over systematically several times, and the alcohol strengthened and replenished as required. The exhibition series still consists only of the separate casts, the yellow-boa group and the group of North American turtles and poisonous snakes. The study series is divided into the North American series, the exotic series and the duplicates. The former are all in separate jars and bottles; a portion of the exotic series is still in storage jars, while most of the duplicates are kept in tanks.

Owing to the prolonged absence of the curator, and the fact that after his return he has been engaged principally in bringing the routine work up to date, but little has been done in the way of conducting special investigations upon the material under his care, beyond the description of the new genus and species of batrachian already referred to.

Specimens have been sent to a number of individuals for study, as indicated in the chapter devoted to transactions of that character, and special facilities were accorded to Prof. E. D. Cope for studying material in the department in connection with his forthcoming monograph.

Among those whose cooperation has been of value to this department mention should be made of Mr. Julius Hurter, St. Louis Mo., and Mr. W. L. Sherwood, New York City.

Four papers based upon Museum material have been published by the curator during the year.

There were 329 specimens received and entered, the last number in the catalogue on June 30, 1895, being 22482, and on June 30, 1896, 22811. The total number of specimens in the collection is estimated at over 35,000.

DEPARTMENT OF FISHES.

The number of accessions to the department of fishes during the year was not so great as during the preceding year. Their scientific value was also somewhat less. A collection of fishes from Nebraska, Wyoming, and South Dakota was received from the United States Fish Commission; also from the same source a collection of types of fishes from the *Albatross* collections in the North Pacific, as well as some material obtained by the same vessel in that locality and in Bering Sea in 1890 and 1891. A collection made by Dr. Leonhard Stejneger in Bering Sea and the vicinity of Kamchatka deserves special notice. A few specimens obtained from the Island of Yesso by Mr. Grebnitzki were also received.

The honorary curator of the department, Dr. Tarleton H. Bean, is still in New York City, as superintendent of the New York Aquarium.

Mr. Barton A. Bean, the assistant curator, states that during the year the collections have been carefully attended to, the bottled specimens having been kept covered with alcohol, and the old labels replaced by new ones where necessary. The collections on the shelves in the fish hall have been condensed by placing several specimens of the same species in one jar. Considerable additional shelf space was thus secured. Some large and valuable collections resulting from explorations in the North Pacific by the steamer *Albatross* were installed during the year. An unusually large number of specimens were distributed, including several sets of deep-sea fishes, which were sent to some of the principal museums in Europe.

The honorary curator and assistant curator have prepared reports upon the fishes collected in the vicinity of the Commander Islands by Dr. Leonhard Stejneger and Mr. N. Grebnitzki; also upon the fishes collected by the latter in Kamchatka and Japan. At the close of the fiscal year Dr. Bean had in course of preparation a report upon the fishes collected in 1887–88 by the *Albatross*, in South American waters. Mr. Barton Bean is assisting in this work.

In January, 1896, Messrs. B. W. Evermann and W. A. Wilcox, of the United States Fish Commission, and Mr. Barton Bean, made an investigation of the fish and fisheries of Indian River, Florida. A report upon these investigations was made to the United States Senate.

Among the explorations which have resulted in enriching the collections, those already referred to indirectly were probably of the most importance, namely, those of the steamer *Albatross*, in the North Pacific, of field parties sent out by the Fish Commission to the western portion of the United States, and the expedition to Florida. A small collection was also made by Rev. P. H. Sörensen, in Greenland.

Material has been sent out for study on a number of occasions, and several ichthyologists have examined the collections in the Museum laboratory.

Dr. Theodore Gill, Associate in Zoology, has published a number of papers on fishes during the year. These are based upon Museum material, some of them containing descriptions of new species. Descriptive papers, based on the collections, have also been published by other collaborators.

Strenuous efforts will be made to improve the condition of the collections by setting aside surplus or duplicate material. The preparation of an exhibit of deep-sea fishes, from 1,000 feet and lower, is contemplated. This exhibit, it is expected, will prove of great interest.

About 3,000 specimens were received during the year, the catalogue entries embracing Nos. 47505 to 47687, inclusive. The total number of specimens in the collection is estimated at 150,000.

DEPARTMENT OF MOLLUSKS.

The honorary curator, Dr. W. H. Dall, states that there was a slight increase in the number of accessions during the year, the total having been 118, while the total for 1894–95 was 111. On the whole, the year has not been marked by anything unusual in the growth of the collections, although many valuable specimens were added. An excellent local collection of shells from Texas, made by Mr. J. A. Singley, was purchased with funds supplied by Dr. L. T. Chamberlain, of New York City. Many very valuable foreign Unios, and other specimens new to the collection, were derived from the same source. In addition, some works have been purchased for the sectional library during the year through Dr. Chamberlain's generosity. Others who have steadily contributed to the collections in this department, and who are thereby entitled to be regarded as regular contributors, are Hon. J. D. Mitchell, Victoria, Tex., who presented a number of species of Unios and other specimens from his locality; Mr. and Mrs. T. S. Oldroyd, Los Angeles, Cal.; Mr. F. F. Crevecœur, Onaga, Kans., who sent in a number of species of land and fresh-water shells; Mr. Henry Hemphill, San Diego, Cal., from whom between thirty and forty species of marine mollusks from San Diego, and other material, was received; Mr. P. B. Randolph, Seattle, Wash., who sent many specimens from his locality; Dr. C. F. Newcombe, Victoria, B. C., from whom marine shells were received; and Dr. W. L. Abbott, who sent material from eastern Madagascar. The addition of greatest importance was the Fish Commission material transferred from the Peabody Museum, New Haven, Conn. This material has been in the hands of Prof. A. E. Verrill for some years for study, and is now being gradually transmitted to the National Museum.

As stated elsewhere, the exhibition series is in good condition, and much has been done in connection with the study series. The excellent system adopted in the installation and registration of these collections will be fully appreciated only when the entire work has been completed.

This matter is thus referred to by Dr. Dall:

The entry of additions to the collection in the register of the department has been carried on as usual. The principal item of work accomplished during the year has been the thorough revision of the basement storage room, in which alcoholics and duplicates are kept. All the bottles have been cleaned and filled up, when necessary, with additional alcohol, the contents catalogued, and each bottle given a number referring to the catalogue, which has been made on cards arranged alphabetically, so that by reference to the cards it can at once be seen whether any particular species is on hand in spirits. If so, the bottle can be reached in a moment, the jars being arranged in numerical order on the shelves. In cases where there was an excessive amount of material in alcohol, the excess has been removed, dried, and cleaned, and placed in the series of dry duplicates, of which a similar card catalogue has been made, the specimens being placed in numbered covered boxes, so that by reference to the cards any species can be reached in a few moments.

The number of jars of alcoholic specimens catalogued so far is 2,002.

The number of dry duplicates in boxes, catalogued, is 4,174 species or lots. All are in perfect order, and with a view to preserving the jars better from dust, which soils them and obscures the labels, the shelves have been provided with covers of enameled cloth.

There is also a considerable number of jars of alcoholics in the north tower, which it is hoped to catalogue and label in a similar manner during the coming year. When these are completed, the entire collection of alcoholics and duplicate recent shells will have been put into excellent order.

Various installments of specimens have been received from Prof. A. E. Verrill during the year. These, as they were received, have been checked off on the lists, the species segregated, and transferred to the standard sizes of tubes and paper trays. I have deferred incorporating them with the reserve collection until the whole series shall be received, so as to make one job of the transfer, which even then will involve a great amount of work.

The series of mounted specimens, illustrating the chief families of mollusks, which was prepared by Mr. Marshall and Mr. Simpson for exhibition as part of the Museum material at the Atlanta Exposition, has been placed in one of the exhibition cases in the main hall.

We have still a large amount of unregistered material, especially in the Jeffreys collection, which will be handled from time to time, as opportunity serves, until all arrearages are made up; but in the absence of expert assistance the progress in this direction will necessarily be slow.

In order to make sure that each specimen in the collection is correctly identified, and to unify the nomenclature, a large amount of work will eventually be required. Work of this character must be performed by a specialist in each group.

Dr. Dall states that he has completed a report upon the collections of land shells made during the progress of the Mexican Boundary Survey, by Dr. E. A. Mearns, United States Army. This collection contains the largest additions to our fauna of this region for many years. A number of additions to the fauna of the coast of Texas, collected by Hon. J. D. Mitchell, have been described or elucidated; also collections made at San Pedro, Cal., by Mr. and Mrs. T. S. Oldroyd, and in Puget Sound and vicinity, by Messrs. P. B. Randolph, of Seattle, and Dr. C. F. Newcombe, of Victoria, British Columbia.

A discussion of the land-shell faunas of volcanic oceanic islands, forming a report on the collections made at the Galapagos Islands, by

Dr. G. Baur, of the Chicago University, has been completed. The type specimens upon which it is based are in the National Museum.

Mr. Robert John Lechmere Guppy, Port of Spain, Trinidad, whose collection of Antillean fossils was purchased by the Museum some years ago, forwarded descriptions of some supposed new species, to be printed in the Proceedings, the types being part of the National Museum collection. The new forms have been figured, and a joint paper by Dr. Dall and Mr. Guppy, on Antillean Tertiary fossils, has been completed, and is now in the hands of the printer.

Work on the Neocene fauna of Florida has been carried on as opportunity served, and will be continued until the study is completed. Mr. Charles T. Simpson has continued his studies on the Naiades. The superficial anatomy of a considerable number of species has been examined, and notes and descriptions prepared. Much time has been spent in searching the literature and preparing cards of synonymy for use in a synopsis of the Naiades.

A number of persons have been engaged in making collections with a view to working out the fauna of their respective localities, submitting all puzzling or doubtful forms to the department for examination. These correspondents in most cases donate types of new or interesting material to the national collection. Explorations carried on by Hon. J. D. Mitchell, Victoria, Tex.; Dr. C. F. Newcombe, Victoria, British Columbia; Mr. P. B. Randolph, Seattle, Wash., and Mrs. T. S. Oldroyd, Los Angeles, Cal., were especially productive of good results. Collections were also made by F. F. Crevecœur, Onaga, Kans.; Dr. Charles L. Gwyn, Galveston, Tex.; J. A. Singley, Giddings, Tex., and the Young Naturalists' Society, Los Angeles, Cal. Reference has already been made to the material obtained.

Dr. Dall states that during the year one hundred and forty applications for the identification of specimens, for advice as to conchological literature, etc., were received from more than one hundred different individuals. The furnishing of this information involved the identification of over three thousand species, and the writing of over one thousand pages of correspondence by the honorary curator and Mr. Simpson. It has always been the practice to grant requests for the identification of material, but the number of applications in recent years has been so great that it has become necessary to formulate a set of rules[1] by which individuals sending specimens for this purpose should be governed. In these regulations it is stipulated that the material must be sent free of expense to the Museum, unless otherwise agreed upon, and that the localities from which the specimens were obtained, must be given. The Museum reserves the right to retain, except under special arrangement, specimens needed to complete the national collection.

No one, other than those connected with the staff, has been engaged in a regular course of study in the department. Probably as many as

[1] Circular 47, U. S. N. M.

a hundred have, however, received verbal information or have been accorded the privilege of examining specimens in the study series.

Twenty-one papers, based upon material in the department, have been published by Dr. Dall, and five by Mr. Charles T. Simpson. One paper has also been published by Mr. G. D. Harris. The titles of these papers appear in the Bibliography (Appendix IV), and in the supplements to the latter will be found the names of a large number of species described, as well as of one family and several new genera.

It is proposed to continue the work on the collections now in progress until the arrears have been registered and catalogued, the Jeffreys and Verrill collections administered upon, and the duplicates eliminated from the reserve series. This will require a considerable amount of time, owing to the extreme pressure of current work.

The total number of specimens received during the year, exclusive of fossils, was 3,173. The number of entries made in the regular catalogues of recent mollusks was 5,449. The following paragraphs contain information as to the other clerical work performed, and also as to the present extent of the collections:

Besides the entries in the register of the reserve collection there have been 175 entries in the register of drawings, 1,628 entries in the register of duplicates, and 3,630 entries on cards for card calalogues, showing a total of 12,103 entries of all kinds during the year ending June 30, 1896.

The additions to the reserves sum up 20,010 specimens, making, when added to last year's figures, a total of 544,398 specimens in the reserve collection. A very low estimate of the number of duplicates will place them at 12,522 specimens. The specimens in alcohol, already catalogued, amount to 20,020, while the unregistered material will add, when catalogued, about 28,000 specimens, making a grand total of about 600,000 specimens in the department of mollusks, exclusive of fossils.

DEPARTMENT OF INSECTS.

There have been several changes in the personnel of this department during the year. Prof. C. V. Riley, who had served as honorary curator since 1882, and who rendered very valuable service to the Museum, died on September 14, 1895. A biographical sketch of his life and work will be found under the head of Necrology.

Mr. L. O. Howard, who succeeded Professor Riley as entomologist of the Department of Agriculture, has been appointed honorary curator of the department of insects in the National Museum. Four honorary custodians have also been appointed during the year, each having charge of a special branch of work, as follows: Mr. W. H. Ashmead, the Hymenoptera; Mr. D. W. Coquillett, the Diptera; Prof. O. F. Cook, the Myriapoda, and Mr. E. A. Schwarz, the Coleopterous larvæ. Mr. M. L. Linell continues to act as aid.

The accessions during the year numbered one hundred and thirty-five, an increase of thirty six over the preceding year. It is believed that, taking the accessions as a whole, they were five times as valua-

ble as those received in 1894–95. The most important accessions were as follows:

Collection of Arachnida of Dr. George Marx, on deposit from Mrs. Minnie Marx.

Collection of insects of all orders from Texas, made by Messrs. E. A. Schwarz and C. H. T. Townsend, and presented by the Department of Agriculture.

Microhymenoptera from Grenada, West Indies (eighty-three species including fifty-five types), presented by the British committee for zoological exploration of the West Indies.

Types of thirty-eight species of North American Empidæ, presented by D. W. Coquillett.

North American Melanopli (twenty-one species, including seventeen types), from Dr. S. H. Scudder, Cambridge, Mass. (Gift.)

North American Noctuidæ (seventeen species including fifteen types), from Prof. J. B. Smith, New Brunswick, N. J. (Gift.)

Collection of parasitic Hymenoptera of Ceylon, from E. Ernest Green, Pundaloya, Ceylon. (Gift.)

Collection of Coleoptera from Egypt and Europe, consisting of about three hundred species in three thousand examples, presented by Dr. A. Féneys, Hélouan, Egypt.

Collection of Cynipidæ from Colorado, including types, from Prof. C. P. Gillette, Fort Collins, Colo. (Exchange.)

Types of six species of Crambidæ, from Prof. C. H. Fernald, Amherst, Mass. (Gift.)

Seventy-four species of North American Lepidoptera, from Dr. W. Barnes, Decatur, Ill. (Exchange.)

Fifty-five species of Brazilian Lepidoptera, from the Department of Agriculture, collected by J. G. Foetterle, Petropolis, Brazil. (Gift.)

Miscellaneous lots of insects from Madagascar and Kashmir, presented by Dr. W. L. Abbott, Bombay, India.

Forty-three species of Coleoptera and Orthoptera, mostly exotics, from Henry G. Klages, Jeannette, Pa. (Exchange.)

North American Diurnals (ten species), from Maj. H. J. Elwes, Colesborne, Gloucestershire, England. (Exchange.)

North American Diurnals (eleven species), from Dr. Henry Skinner, Philadelphia, Pa. (Exchange.)

Collection of insects from the Commander Islands, collected by Dr. L. Stejneger, United States National Museum.

Large series of North American insects, from the Department of Agriculture, collected by correspondents. (Gift.)

Types of early stages of Odonata, from James G. Needham, Knox College, Galesburg, Ill. (Gift.)

New species of Diptera from Mammoth Cave, presented by Dr. R. Ellsworth Call, Cincinnati, Ohio.

Sixty-five species of English Diptera, from E. Brunetti, London, England. (Exchange.)

The biological collections in Lepidoptera have been completely rearranged in cabinet drawers, and the collection of Melanopli, lent by Dr. Scudder, and the African Lepidoptera, lent by Dr. Holland, were installed. A rearrangement of the North American Coleoptera has been commenced, the families Scarabæidæ and Cerambycidæ having already been finished. The recent accessions of Hymenoptera and Lepidoptera have been incorporated in the collections. A portion of

the exhibition series is displayed in the lower hallway leading to the offices of the department. The systematic series, since its return from the Cotton States and International Exposition at Atlanta, has been placed upon exhibition, while the exotic showy insects prepared for the same Exposition have been distributed in the study collections. The reserve collections for study are, generally speaking, in good condition. In order to properly classify the Lepidoptera, however, much work must still be done. The types have not yet been catalogued except in this order.

A large amount of scientific work has been accomplished by the members of the staff during the year, as will be seen from the following extract from Mr. Howard's report:

The curator has published a revision of the Aphelininæ of North America, and a paper on the "Grass and Grain Joint-worm Flies and their Allies," in Technical Series Nos. 1 and 2, United States Department of Agriculture. These papers are based upon Museum material. He has also completed, but not yet published, a report on the Chalcididæ of the Island of Grenada, and, conjointly with Mr. Ashmead, a brief paper on some reared parasitic Hymenoptera from Ceylon.

Mr. Ashmead has completed and published his report on the parasitic Hymenoptera of the Island of Grenada, comprising the families Cynipidæ, Ichneumonidæ, Braconidæ and the Proctotrypidæ, submitted by Dr. David Sharp on behalf of the committee for investigating the flora and fauna of the West Indian islands. He has also described a new genus and two new species of Proctotrypidæ from Trinidad, submitted by Mr. F. W. Urich; and in a paper published in the Transactions of the American Entomological Society, Philadelphia, June, 1896, he described a large number of new parasitic Hymenoptera. During the year, besides rearranging some of the families of the Aculeate Hymenoptera and Hemiptera, he identified several hundred species of Hemiptera and between two and three thousand species of Hymenoptera for correspondents of the Department of Agriculture. Monographic work is also being done on the families Braconidæ, Cynipidæ, and Chalcididæ.

Mr. Coquillett has published a revision of the North American genera and species of Empidæ, in which four new genera and sixty-six new species are described. Types of all of these new forms are now in the National Museum. He has also identified the Culicidæ in the National Museum, and described three new species in the Canadian Entomologist for February, 1896, and in a paper on the Diptera of Florida, published in the Proceedings of the Academy of Natural Sciences of Philadelphia for 1895, he described a new species of *Platyura* and one of *Drosophila* from specimens in the National Museum. He is now engaged in identifying the Tachinidæ in the National Museum collection, and has nearly completed a monograph of the same.

Mr. Linell has completed reports on the Japanese Coleoptera (Acc. 27854), on the Coleoptera of the Chanler and Höhnel expeditions, and on the insects collected by Dr. W. L. Abbott on the Indian Islands, north of Madagascar. A restudy of the North American Coleoptera of the families Scarabæidæ and Cerambycidæ has resulted in two descriptive papers, now being published in the Proceedings of the National Museum.

Of the explorations which have resulted in enriching the collections, nearly all were confined to localities outside of the United States. The material obtained is referred to in the list of important accessions given above, and only a brief reference will therefore be made in this place. The British West India Committee for Zoological Exploration conducted

explorations on Grenada Island; Dr. W. L. Abbott collected in Madagascar and Turkestan; the Chanler-Höhnel expedition to Jombéné Range, East Africa, collected insects and other material; the United States Department of Agriculture sent Messrs. E. A. Schwarz and C. H. Tyler Townsend to Brownsville, Tex., to investigate the Cotton Boll-weevil; Dr. Leonhard Stejneger visited the Commander Islands and Kamchatka and incidentally collected a number of insects; Mr. F. W. True, of the United States National Museum, and Mr. D. W. Prentiss, jr., of this city, visited the Pribilof Islands while temporarily in the service of the United States Fish Commission; Prof. C. V. Riley and Mr. H. G. Hubbard went to the West Indies in the spring of 1895; Mr. W J McGee collected during his trip to Tiburan Island, Gulf of California, and Messrs. E. A. Schwarz and H. G. Hubbard collected in the vicinity of Salt Lake, Utah.

Material has been sent from the department to fourteen individuals, including several prominent specialists in various orders. In some cases the specimens were transmitted for identification, and in other instances they were desired for comparison. A few investigators not connected with the Museum have made use of the collections in the department.

The honorary curator mentions the names of eight correspondents who have made contributions and who have received publications in partial exchange. Exchanges of specimens have been arranged with nine other individuals in this country and abroad. The correspondents who have sent material for identification which has been retained in the Museum number fourteen.

Thirty-three papers based upon Museum material have been published during the year by members of the staff, and seventeen by other collaborators. The titles of these papers appear in the Bibliography (Appendix IV). A very large number of new species are described. The names of these are given in the supplements to the Bibliography.

About 7,000 specimens were added during the year, exclusive of the Marx collection, which was received on deposit and embraces about 10,000 specimens. The last catalogue entry on June 30, 1895, was 1584, and the last on June 30, 1896, 1789, giving 205 entries for the year.

DEPARTMENT OF MARINE INVERTEBRATES.

This department remains in charge of Mr. Richard Rathbun as honorary curator, with Mr. James E. Benedict and Miss Mary J. Rathbun as assistant curators.

During the year a study of the Annelids of the west coast of tropical America was commenced, and work on a monograph of the American Brachyura and special researches on the genera *Pseudothelphusa* and *Sesarma* have been carried on. Mr. Benedict made a study of some new species of blind Crustacea taken from an artesian well in San Marcos,

Tex., preliminary descriptions of which have already appeared in the Proceedings. Complete descriptions will be published later. Miss Rathbun has prepared an annotated list of the Decapod Crustacea of Jamaica, for publication by the Institute of Jamaica. A paper containing descriptions of the new forms will be published in the Proceedings, and is now in press. Miss Rathbun spent about two weeks in the summer of 1895 examining literature relating to the Crustacea in the libraries of Boston and Cambridge.

There were sixty-nine accessions to this department during the year. Generally speaking, the accessions for the present year were not so large or so important as those of the preceding year, although the material received from the United States Fish Commission exceeded in value that of the accessions obtained from the same source during 1894–95.

The principal additions to the collections during the year are thus described by the curator:

From the United States Fish Commission were received six accessions, comprising a large amount of material collected by the steamer *Albatross*, chiefly in the Pacific Ocean and Bering Sea; also the following: Crustacea collected during the cruise to the Galapagos Islands in 1891, representing groups Podophthalma, Copepoda, pelagic Schizopoda, Pantopoda and larvæ of Stomatopoda; medusæ and hydroids studied by Prof. J. Walter Fewkes; Crustacea from St. Paul Island, Bering Sea, collected by Messrs. F. W. True and D. W. Prentiss, jr.; invertebrates from Kamchatka and the Commander Islands, collected by Dr. L. Stejneger, and invertebrates from Japan, collected by N. Grebnitzki. (Gift.)

From the Imperial Royal Natural History Museum, Vienna, Austria, through Dr. Franz Ritter von Hauer, fourteen species of echinoderms dredged by H. M. S. *Pola* in the eastern Mediterranean, 1890–1894. (Exchange.)

From the Royal Biological Station, Helgoland, through Dr. Ehrenbaum, forty-six species of Crustacea from the North Sea. (Exchange.)

From Edgar J. Bradley, Happy Valley Waterworks, South Australia, four accessions of Crustacea and other invertebrates from Australia. (Exchange.)

From Glen Island Museum, Glen Island, N. Y., through L. M. McCormick, curator, fourteen species of invertebrates from the Gulf of Aden. (Exchange.)

From Museo Nacional, San José, Costa Rica, through J. Fid. Tristan, many fresh-water crabs, including several new species. (Gift.)

From H. Pittier, director, Instituto Fisico-geografico Nacional, San José, Costa Rica, twelve lots of Crustacea from Gulf of Dolce, Costa Rica, several species being rare. (Gift.)

From P. W. Jarvis, Colonial Bank, Kingston, Jamaica, specimens of crabs, including many new and rare forms. (Exchange.)

From Lieut. Wirt Robinson, United States Army, twelve species (one new) of crustaceans and echinoderms from Venezuela (Gift.)

From the Department of Agriculture, through Dr. C. Hart Merriam, Chief of the Biological Survey, fresh-water crabs and shrimps from Mexico (collected by Nelson and Goldman), yielding two new species. (Gift.)

From W. P. Hay, Washington, D. C., thirteen species of named isopods and amphipods. (Exchange.)

From F. S. Conant, Johns Hopkins University, Baltimore, Md., types of three species of chætognaths. (Gift.)

From Prof. S. E. Meek, Fayetteville, Ark., types of *Camburus faxonii*, Meek. (Gift.)

From P. H. Sörensen, Jakobshavn, North Greenland, miscellaneous invertebrates. (Gift.)

From H. F. Hughes, Harbor, Oreg., specimens of two undescribed species of hydroids. (Gift.)

From H. A. Lafler, Dewitt, Nebr., three accessions of fresh-water Crustacea. (Gift.)

From Museum of Comparative Zoology, Cambridge, Mass., three species of Brazilian crabs (*Callinectes*). (Exchange.)

From Samuel J. Holmes, Chicago, Ill., three anomuran crustaceans. (Exchange.)

From Prof. A. Dugès, Guanajuato, Mexico, eight specimens of crabs (*Pseudothelphusa jouyi*, Rathbun). (Gift.)

Material resulting from explorations, as will be noted from the above statement, embraced that received from the United States Fish Commission; from the Imperial Royal Natural History Museum, Vienna; from the Royal Biological Station, Helgoland, and from the United States Department of Agriculture.

A great deal of time is consumed by the scientific force of this department in the selection and preparation of collections sent out in exchange or as gifts. The composition of the sets of the regular series of duplicates has been set forth in previous reports. The last set of Series IV was sent out during the year just closed, and seven sets of Series V were distributed. Twelve special sets were prepared, several of which were for exchange with foreign museums or individuals. In addition, nine collections of unassorted foraminiferous material were distributed.

A fine collection of miscellaneous invertebrates, including a number of commercial sponges, was lent to the United States Fish Commission for exhibition at the Cotton States and International Exposition at Atlanta. For the exhibit of the National Museum at the same Exposition a large and showy collection of invertebrates, consisting chiefly of dried specimens mounted on tablets, was prepared by Mr. Benedict, who was assisted in this work by Prof F. M. Comstock, of the Case School of Applied Science, Cleveland, Ohio. The work of installing this exhibit at the Exposition and of repacking it for shipment to Washington occupied Mr. Benedict's time for one month.

About 4,200 lots of specimens, consisting chiefly of mollusks, have been received from the Peabody Museum, New Haven, where the work of separating and classifying the material collected by the Fish Commission in past years has been continued by Professor Verrill.

The following statement regarding matters incident to the care of the collections is taken from the curator's report:

The former "reptile room" in the west basement was reassigned to this department early in January. New and commodious shelving was erected in the middle of the room, and the extra accommodation afforded for alcoholics permitted a more systematic arrangement of the collections in storage in the basement. The groups are now arranged in the main as follows: The echini, starfishes, and holothurians are in the west room; the anthozoa and crinoids in the reptile room; the crustaceans, bryozoans, ascidians, and ophiurans in the main basement room, and the sponges are arranged in exhibition cases.

In transposing the collections the small tower room leading from the gallery was abandoned, and also all the cases in the hall of the west basement.

The northwest tower, opening from the exhibition hall, was fitted with additional shelving, and certain collections of annelids and anomurans which were needed for study, and other material, has been stored there.

During the year the alcoholic collections have been examined, alcohol added to replace that lost by evaporation, and stoppers and rubbers renewed where necessary.

A new card catalogue has been started, with cards of the library bureau size. Labels printed on red paper are now used for jars and bottles containing type specimens, and a white label with the word "type" printed in large red capitals is placed inside the jar.

An exceedingly interesting addition to the exhibition series in this department consists of a type series of Foraminifera mounted for microscopic examination in such a manner as to make it readily accessible to the public. This series was prepared by Dr. J. M. Flint, U. S. N., who has prepared for publication a description of the method of mounting and also of the specimens included in the series.

An article containing instructions for the preservation of specimens, and intended especially for collectors on board ship, was prepared for publication by the Fish Commission.

In addition to the paper already mentioned as having been published by Mr. Benedict, five others, based upon Museum material, have been published by various collaborators. Several new genera and some thirty-five new species are described in these papers.

The work already planned for the future includes the placing upon exhibition of one or more specimens of each species of invertebrates in the Museum collections whose bathymetrical range exceeds 1,000 feet; the preparation of an educational series embracing all of the principal groups of invertebrates, for distribution to high schools and academies, and the preparation of a complete card-catalogue of the types in the department, with reference to the original description, type locality, etc.

The number of specimens received during the year exceeded 4,800. The following statement shows the number of catalogue entries:

Group.	Entries to June 30, 1895.	Entries to June 30, 1896.	Number of entries during year.
Crustaceans	18,811	19,475	664
Worms	4,971	4,972	1
Bryozoans and Ascidians	2,888	2,888	.....
Echinoderms and Coelenterates	18,149	18,537	388
Sponges and Protozoans	7,486	7,489	3
Total			1,056

HELMINTHOLOGICAL COLLECTION.

Several series of specimens have been added to this collection during the year, the most important being the one deposited by the Bureau of

Animal Industry of the Department of Agriculture. The accessions include some very valuable specimens.

Owing to lack of space, it has been impossible to make much progress in the work of administering upon the collections, although new labels are being installed throughout. An effort is now being made to collect types and cotypes from Europe and America.

The work of the custodian, Dr. C. W. Stiles, has included a revision of the adult tapeworms of hares and rabbits.

Pending the entry and cataloguing of the specimens received from the Bureau of Animal Industry, no estimate can be given of the number of specimens in the collection. More than 1,400 entries have been made in the catalogue since the last report, making a total of 1,550 entries to June 30, 1896.

Several papers have been published by Dr. Stiles during the year, the titles of which will be found in the Bibliography (Appendix IV).

DEPARTMENT OF COMPARATIVE ANATOMY.

The accessions have been fewer than during the preceding year, although the material received is reported by the curator, Mr. F. A. Lucas, to possess considerable scientific value. A skeleton of *Pontoporia blainvillei*, for a long time a special desideratum, was received from the La Plata Museum in exchange.

Toward the close of the fiscal year it became necessary to remove all the cases from the exhibition hall, in order to lay a new floor. This effectually prevented, for the time being, any additions to or improvements in the exhibition series.

Regarding the actual work upon the collections, Mr. Lucas says:

> Aside from the moving of specimens, necessitated by changes in the workroom, exhibition hall, and basement of stable where alcoholics are stored, little has been done, the greater part of the time of the preparator having been devoted to the preparation of specimens for the department of mammals and the Department of Agriculture, and work connected with the Atlanta Exposition. Copy has been prepared for many labels, and some additions have been made to the synoptic series of invertebrates. A number of additions have also been made to the exhibition series in the way of skeletons and models acquired for the Atlanta Exposition.

The study series is in good condition, except that the specimens are crowded. This is due in part to the fact that it has been necessary to assign considerable space to the Department of Agriculture deposit, necessitating the storage of some of the Museum material, and the transfer of nearly all of the cetaceans to the rooms occupied by the department of mammals.

Mr. Lucas has commenced a study of the changes in the skull of the cormorants, and has continued his studies of the tongues of birds and their modification and adaptation to various kinds of food and the manner of obtaining it. A study of the skull of the extinct Pallas Cormorant has been completed. Other investigations, which are being conducted by Mr. Lucas in connection with his work in vertebrate

paleontology, are referred to in the review of the department of paleontology.

Ten papers have been published during the year by the curator. He also completed and edited a posthumous paper of Dr. Joseph Leidy on "Fossil Vertebrates of the Alachua Clays of Florida."

Among those who have cooperated with the department, Lieut. Wirt Robinson, United States Army, and Mr. A. W. Anthony, San Diego, California, should be mentioned, the former having contributed several species of humming-birds in alcohol, and the latter some specimens of petrels.

Referring to the further development of the department, Mr. Lucas submits the following plans:

It would be very desirable to fill up the gaps in the exhibition series of birds, reptiles, and fishes, to extend the tooth series and that showing the modifications of the dermis and epidermis, and to add to the synoptic series of invertebrates.

A few changes of irons and pedestals are needed among the mammals, and a large number of labels should be supplied where they are now lacking. Finally, the exhibition series needs much rearrangement, as also does the study series.

In regard to scientific work, the curator would like to complete the study of the development of the skull among the cormorants, and, if material can be obtained, to finish work on the osteology of the cormorants in relation to the origin and distribution of the group. It is hoped that the paper on the fossil bisons of North America may be completed and work begun on the Dinosaurs of the Potomac. It is also desirable to continue the study of the swifts and of the modifications of the tongues of birds, while the paper on the Zeuglodon, undertaken in conjunction with Mr. True, should be proceeded with as rapidly as possible.

About the middle of June, 1896, Mr. Lucas started for the Pribilof Islands as a member of a special commission appointed by the President to investigate the present condition of the fur-seal herds on the Pribilof, Commander, and Kurile islands.

The number of specimens added during the year is as follows: Fishes, 51; reptiles, 62; birds, 69; mammals, 17; models, 8; total, 207. There are now over 15,000 specimens in the collections. The last catalogue entries at the end of the year just closed and at the end of the preceding year are shown in the following table:

	June 30, 1895.	June 30, 1896.
Fishes	26,175	26,185
Reptiles	29,382	29,395
Birds	19,393	19,440
Models	53,512	53,520

DEPARTMENT OF PALEONTOLOGY.

This department remains in charge of Mr. Chas. D. Walcott, Director of the United States Geological Survey, who holds the position of honorary curator.

The scientific value of the material received has been far greater

than that of the accessions in the preceding year. An increase is also noted in the number of accessions. A collection of vertebrates, made under the direction of Prof. O. C. Marsh, which has been on exhibition in the Museum for several years, was formally transferred from the United States Geological Survey. There were also received from the same source one hundred and fifteen boxes of unprepared vertebrate material from Kansas, a valuable collection of Green River fishes, a series of specimens studied by Professor Leidy and Mr. Lucas, a few fossil insects collected by Mr. David White, and an identified collection of Cephalopoda, studied by Prof. Alpheus Hyatt, Cambridge, Mass. Mr. Charles Schuchert, the assistant curator, collected for the Museum an extensive series of Devonian fossils, embracing about sixteen thousand specimens. These were obtained in New York, Ontario, and Michigan. Over two thousand six hundred specimens of Middle Cambrian fossils from Newfoundland and from St. Davids, Wales, were purchased from Mr. E. E. Howell, of this city. Another installment of fossil plants, together with a series of fossil fishes, was received from Mr. R. D. Lacoe, of Pittston, Pa. A large and valuable collection of fossils from various horizons, collected by the late Dr. Daniel Breed, was transmitted through Prof. B. T. Janney, administrator of the estate. This material was received in part as a gift and in part as an exchange. Mr. George Kernahan, Thedford, Ontario, contributed an excellent collection of Middle Devonian fossils, embracing 442 specimens. A collection of teeth and bones of mammals, exhibited at the Cotton States and International Exposition at Atlanta, was given to the Museum by the Peace River Phosphate Company of Florida. From Princeton College there were received in exchange skulls of *Ischyromys typus*, *Leptauchenia major*, and *Eucrotaphus bullatus*. From Dr. Herman Credner, Leipsic, Germany, fourteen specimens of *Branchiosaurus amblystomus* were obtained in exchange. In the same manner a collection of fossils and casts was secured from the Museo de la Plata, La Plata, Argentina; a large collection of Clinton and Niagara fossils, including many graptolites, from Col. Charles C. Grant, Hamilton, Ontario; thirty-six species of Russian Cretaceous fossils from Prof. A. Pavlow, Moscow, Russia; and a collection of characteristic Middle Devonian fossils from Mr. R. Macintosh, Thedford, Ontario. Four fine fossil medusæ, from the Jurassic of Germany, were purchased from Dr. F. Krantz, Bonn, and other material worthy of mention was contributed as follows: Several collections of fossils from Galveston, Tex., from Mr. J. A. Singley; a collection of Lower Carboniferous fossils from Dr. J. H. Lemon, New Albany, Ind.; two collections of interesting fossils from the Choteau formation of Missouri, from Mr. R. A. Blair; and a series of characteristic Middle Devonian fossils from Mr. Malcom McKinnon, Thedford, Ontario.

The transfer of the magnificent Lacoe collection from Pittston, Pa., the residence of the donor, to Washington was completed during the

present fiscal year. The collection was formally offered to the Museum in December, 1891, and its extent and extraordinary scientific value were referred to at length in the report for the fiscal year ending June 30, 1892. A brief statement of its contents may not, however, be out of place. The collection was included in three hundred and fifteen boxes, as follows:

Two hundred and eight boxes, embracing over seventeen thousand specimens of Paleozoic plants. These include (1) types, and (2) specimens showing variation of species and geographic and geologic distribution. The contents of thirty-four of these boxes have not yet been determined.

Two boxes of Paleozoic plants.

Ninety boxes of duplicate Paleozoic plants.

Two boxes of Triassic fishes.

Two boxes of Paleozoic fishes.

One box of Paleozoic Crustacea.

Three boxes of Upper Cretaceous and Tertiary plants.

Seven boxes, including eight hundred and four specimens of plants from the Dakota group, described in Monograph XVII, United States Geological Survey. One hundred and twenty-five of these specimens are types, and fifty-five were figured in the Monograph.

The motive of the donor in presenting this material, as stated by himself, was the belief that this disposition of it would best fulfill his purpose in the formation of the collection, which was to accumulate as complete a series as possible of the older fossil flora for use in paleontological research. No conditions were imposed which would in any way interfere with the proper use of the collection. It was desired, however, by the donor that it should be known as the "Lacoe Collection," and that it should be kept entire, with such additions as might be made to it in the future by further contributions from himself or by the exchange of duplicates. That the material should be made accessible to students generally is in accordance with the established rules of the Museum, and that every effort should be made for the proper preservation of so valuable a collection was a foregone conclusion. This collection represents the results of the scientific labors of Mr. Lacoe for twenty years or more. Not being satisfied, however, with the time which he could devote to the work in person, he employed collectors in various States and in the Canadian Provinces, and also expended large sums of money in the purchase of private collections. About seven hundred and fifty published types are embraced in that portion of the collection which has been described. The series illustrating the morphology of species and their geographical and geological distribution includes over seventeen thousand specimens. While the collection represents more thoroughly than any other in existence the fossil flora of the Pennsylvania anthracite regions, there are, in addition, good series from Illinois, Tennessee, Missouri, and other States, as well as from Nova Scotia, New Brunswick, and Brazil. Besides the plants from the Paleozoic formations, there are examples of the Cretaceous and Tertiary flora of Colorado, a series of Triassic and Paleozoic

fishes and Crustacea, and a collection of eight hundred and four plants from the Dakota group. A portion of the latter was, as already mentioned, described by Professor Lesquereux, in Monograph XVII of the United States Geological Survey. Professor Lesquereux also studied the material from the Cretaceous and Tertiary of Colorado referred to above, and the Triassic and Paleozoic fishes and Crustacea have been studied by Cope, Hall, Whitfield, and others.

It is not too much to say that the National Museum has never received a gift of greater scientific value or importance than that acquired through the generosity of Mr. Lacoe.

Interesting data concerning the number of published types of Paleozoic plants in the Lacoe collection, and in the other collections of the National Museum, are presented in the following tabulated statements:

I.—PALEOZOIC PLANT TYPES IN THE LACOE COLLECTION.

Publications.	Number of new species.	Supplemental species.	Originals figured.	Originals not figured but described.	Supplemental species figured.	Supplemental species described.	Author.
Coal Flora, Second Geological Survey of Pennsylvania.	235	174	325	200	151	175	Lesquereux.
Proceedings American Philosophical Society, XVII.	14	1	19	2	1	.....	Do.
Proceedings American Philosophical Society, XVIII.	2	.....	4	.....	.....	.....	Do.
Report Geological Survey of Illinois, IV.	4	1	5	.....	2	.....	Do.
Report Geological Survey of Indiana, VIII.	3	.....	4	.....	.....	.....	Do.
Proceedings U. S. National Museum, XVI.	4	1	4	.....	1	.....	Penhallow.
Canadian Record of Science, IV.....	2	.....	3	3	.....	.....	Dawson.
Fossil Plants of the Erian (Devonian) and Upper Silurian Formations of Canada, II.	.....	2	.....	.....	2	.....	Do.
Catalogue Pottsville Scientific Association.	1	.....	1	.....	.....	.....	Lesquereux.
Report First Geological Survey of Arkansas, II.	2	.....	2	.....	.....	.....	Do.
Transactions Royal Society of Edinburgh, XXXIII.	1	.....	1	.....	.....	.....	Kidston.
Proceedings Royal Physical Society of Edinburgh, VII.	1	.....	1	.....	.....	.....	Do.
Proceedings Royal Physical Society of Edinburgh, IX.	1	.....	1	.....	.....	.....	Do.
Total.....	270	179	370	205	157	175	

II.—PALEOZOIC PLANT TYPES PREVIOUSLY IN THE MUSEUM COLLECTION.

Publications.	Number of new species.	Supplemental species.	Originals figured.	Originals not figured but described.	Supplemental species figured.	Supplemental species described.	Author.
Wilkes Exploring Expedition, Geology.	3	1	3	15	1	14	Dana.
Coal Flora, Second Geological Survey of Pennsylvania.	2	1	3	.....	.....	.....	Lesquereux.
Bulletin U. S. Geological Survey, No. 98.	4	22	24	6	16	.....	White.
Bulletin Philosophical Society of Washington, 1875.	5	.....	15	6	.....	.....	Meek.
Proceedings U. S. National Museum, X.	1	.....	.....	.....	.....	.....	Lesquereux.
Proceedings U. S. National Museum, XI.	3	3	6	.....	14	.....	Do.
Proceedings U. S. National Museum, XIII.	3	.....	10	.....	.....	.....	Do.
Proceedings U. S. National Museum, XVI.	3	2	4	.....	8	.....	Penhallow
American Journal of Science (3), XXXVII.	1	.....	3	.....	.....	.....	Knowlton.
Bulletin Geological Society of America, IV.	1	.....	7	.....	.....	.....	White.
Total	26	29	75	27	39	14	

III.—SUMMARY.

Lacoe collection	270	179	370	205	157	175
Already in the Museum collection ...	26	29	75	27	39	14
Total	296	208	445	232	196	189

Number of original types in the Lacoe collection 575
Number of original types previously in the Museum collection 102
Total number of original types of Paleozoic plants 677

The collections of this department are also to be enriched by Mr. I. H. Harris, of Waynesville, Ohio, who has signified his intention of presenting to the National Museum his magnificent series of fossils. This collection is the result of the labors of Mr. Harris during the past fifty years, and is very rich in rare fossils, such as trilobites, crinoids, and starfishes. It includes also a fine collection of mollusca from the upper portion of the Cincinnati formation. Mr. Harris and Mr. Schuchert are engaged in the preparation of a monograph of American fossil starfishes, based upon this material.

The present condition of the paleontological collections and the progress made in caring for and installing the material are indicated in the following extract from the report of the assistant curator, Mr. Charles Schuchert:

Much of the time during July was devoted to preparing the Zeuglodon material gathered by the assistant curator last year. It was chiefly from this material that the restoration of Zeuglodon was prepared for the Atlanta Exposition. During

July and August a small series illustrating some of the characteristic plants and animals of the various geological horizons was selected, and the specimens mounted upon tiles in an attractive manner for exhibition at the Atlanta Exposition. This collection received honorable mention.

From October 22 to about May 15 attention was given to the exhibit and study collections, but nothing could be done toward the contemplated mounting of the exhibition series in this department, excepting the Mesozoic and Tertiary plant collections, which are now practically finished. The time from May 15 to July 1 was devoted to mounting the "Historical collection of fossils" in the department of geology. It was deemed best, before attempting the mounting on tiles of the general exhibition collection of fossils, to experiment upon a smaller collection. The first trial was that of the fossils exhibited at Atlanta, and a second and far larger test was made with the "Historical collection" in the department of geology. It is now certain that the mounting of fossils upon tiles has decided advantages over paper, wood, slate, or ground-glass tablets. The only disadvantage observed is that tiles, because of the somewhat greater thickness necessary for their stability and flatness, are heavier than the other kind of tablets. This disadvantage, however, is not a fatal one. Considerable time during the year was given by Mr. David White, assisted by Messrs. Williard and Whipple, toward the further arrangement of the study series of the Lacoe collection. This work is not yet completed, and will not be until another case is built in the east room of the south tower. That portion of the Lacoe collection on exhibition remains in the same condition as last year. It is, however, hoped to complete, mount, and label this series during the next fiscal year.

While considerable time has been devoted to the invertebrate study series, much more work will have to be done before any intelligent selection can be made for the final exhibition series. The exhibit collection of vertebrates is in fair order, but more space is required to relieve it of its present congested condition. In the last annual report it was suggested that permanent cases be built along the north wall of the southeast court. Much vertebrate material is nearly ready for installation, and more will soon be at hand, for all of which additional space is necessary.

Eight hundred and eighty boxes of fossils are in storage, awaiting development and installation in the exhibition or study series.

The duplicate fossils are being removed from the study series as fast as possible, and laid aside for future exchange and distribution.

The Director of the United States Geological Survey has recently appointed Mr. H. E. Dickhaut, and the Museum, Mr. T. E. Williard, as preparators under the direction of the assistant curator. Work will progress hereafter far more rapidly with the material in the Museum building, and it is hoped that some of the fossils now in storage will be removed during the year. However, the staff of this department has had in the past all it could do to arrange the collections as they came in from the field or from individuals.

Each summer various Geological Survey parties send in collections, and it is the custom for this department to assist in their preparation for study and in recording the material upon the Museum catalogues.

The Lacoe collection is not yet completely housed. This is due, in part, to the fact that the Museum has no paid officer directly in charge of fossil plants. However, Mr. David White has made considerable progress in this direction, and it is hoped, with the assistance of Mr. Williard, to complete the installation of the collection during 1896–97.

Considerable scientific work, based upon material in this department, has been accomplished during the year. The preparation of a monograph on American fossil starfishes, by the assistant curator, Mr. Charles Schuchert, and Mr. I. H. Harris, has been referred to. Mr.

Schuchert has also completed a study of the American fossil Apodidæ, the manuscript of which has been turned over to the editor. The "Synopsis of American fossil Brachiopoda," by the same author, referred to in the last Annual Report, was completed during the present year, and is now being revised. A short summary of this work has already appeared in Science. The titles of two or three other papers by Mr. Schuchert are given in the Bibliography (Appendix IV). Mr. F. A. Lucas has begun a study of the character and affinities of the species of Zeuglodon, and a study of the species of the North American bison, with synopses of their salient characters, is well advanced. A posthumous paper of Dr. Joseph Leidy, edited by Mr. Lucas, has been published. It is entitled "Fossil Vertebrates from the Alachua Clays of Florida." Mr. David White has made considerable progress with the description of new species in the Lacoe collection, regarding which Professor Lesquereux left some manuscript. Dr. R. R. Gurley has in preparation a revision of American Graptolites. This work will be published by the United States Geological Survey, but is based upon material which will become the property of the Museum. Mr. T. W. Stanton has published a work entitled "Contributions to the Cretaceous Paleontology of the Pacific Coast." This is an illustrated work, and contains descriptions of about fifty new species and one new genus.

The explorations which have resulted in enriching the collections include those of Mr. Schuchert in New York, Ontario, and Michigan, already referred to indirectly in the statement regarding important accessions, and those made by the United States Geological Survey. Much of the material collected by the Survey during the present year has not yet been transferred to the Museum. It includes, however, a fine collection of Lower Silurian fossils from Valcour Island, Lake Champlain, and a collection of trilobites from Rome, N. Y. Although the Zeuglodon material collected by the assistant curator in 1894 was of great interest and value, no good skull and none of the bones of certain portions of the skeleton were secured. For this reason it is very desirable to continue these explorations with a view to securing the missing parts, if possible.

Material for study has been sent to ten specialists during the year. Dr. R. R. Gurley, Prof. Alpheus Hyatt, Cambridge, Mass., and Prof. H. F. Osborn, American Museum of Natural History, New York City, conducted investigations in the department. These matters are referred to more at length in the chapters entitled "Material Lent for Investigation" and "The Work of Students and Investigators at the Museum."

A preparator of plants and invertebrate fossils has been employed during the year. It has not yet been possible, however, to appoint a preparator of vertebrate fossils, although the need for such an assistant is greatly felt. The necessity for additional cases to relieve the crowded

condition of the collections is also pressing, and is referred to in the report of the department as follows:

It is urgent that cases be provided at an early date to relieve the present congested condition of the vertebrate collections and to provide space for the rapidly accumulating material. There are two hundred and twenty-five boxes of vertebrate material now in storage, awaiting a preparator. The preparation of this material for study and exhibition will occupy all the time of one man no less than three years, and it is to be hoped that means will be available during 1896–97 to secure such a person.

* * * * * * *

All the rooms now occupied by the various sections in the department of paleontology are crowded, and, while here and there small areas are available for additional cases of standard drawers, more exhibition space is required. This is especially so in the section of vertebrate fossils, since nearly all of the organisms are large and can best be housed in the exhibition series. Space for these collections can be secured if permanent cases are built around the walls of the southeast court and the standard cases now occupying that space be placed upon a gallery. If such a gallery is built in the southeast court, ample exhibition and storage space will be at hand for the natural increase of the collections during the next few years.

Further drawer space is necessary to complete the housing of the Lacoe study collection. More than two-thirds of this collection is now stored in the two upper rooms of the south towers of the National Museum building. The west room is completely occupied with cases provided with standard drawers, while the east room is but half occupied.

It is not possible to give accurate figures for the number of specimens received during the year in the various sections of the department. The figures given below represent the catalogue entries and the additions to the permanent collections.

	Catalogue entries.	Number of specimens added to the collections.
Paleozoic invertebrates	324	832
Mesozoic invertebrates	328	2,574
Cenozoic invertebrates	1,222	3,663
Vertebrates	73	81
Fossil plants	1,074	2,616
	3,209	9,766

DEPARTMENT OF PLANTS (NATIONAL HERBARIUM).

The number of accessions for the year was two hundred and thirty-six, as against six hundred and seventy for the preceding year. There was, however, no falling off in the number of specimens included, but, on the other hand, a slight increase. The question of scientific value is of greatest importance, however, and when the accumulations of the year are measured by this standard the results are very gratifying.

Among the important accessions were five lots of Mexican plants, purchased from Mr. E. W. Nelson, and aggregating two thousand four hundred specimens; five hundred and eleven specimens presented by the Botanical Gardens, Calcutta, India; fifty-eight specimens presented

by Baron Ferd. von Müller, Melbourne, Australia; one hundred and thirty-five ferns presented by Hugo Fink, Cordova, Mexico; two hundred and thirty-eight specimens from the United States Fish Commission, and thirty specimens from C. F. Sonne, Truckee, Cal. Valuable material was received in exchange from the Royal Gardens, Kew, England, consisting of two hundred and fifty specimens of Umbelliferæ, and Dr. Leonhard Stejneger collected eighty specimens for the Museum in the Commander Islands.

Many important accessions were also received through the United States Department of Agriculture, including the following:

C. Copineau, Paris, France, 208 specimens of European and African plants. (Exchange.)
Berlin Botanical Gardens, 80 specimens. (Exchange.)
University of Minnesota, Minneapolis, Minn., 36 specimens. (Exchange.)
A. C. Recksecker, Oberlin, Ohio, 161 specimens. (Exchange.)
Zurich Botanical Gardens, Zurich, Switzerland, 181 specimens. (Exchange.)
C. V. Piper, Seattle, Wash., 224 specimens. (Exchange.)
Baron Ferd. von Müller, Melbourne, Australia, 97 specimens. (Gift.)
B. Fink, Fayette County, Iowa, 226 specimens. (Exchange.)
C. L. Pollard, Washington, D. C., 725 specimens. (Gift.)
J. M. Macoun, Ottawa, Canada, 100 specimens. (Gift.)
C. E. Waters, Baltimore, Md., 20 specimens. (Gift.)
W. M. Canby, Wilmington, Del., 107 specimens. (Gift.)
W. J. Beal, Agricultural College, Mich., 139 specimens. (Gift.)
Thos. C. Porter, Easton, Pa., 500 specimens. (Gift.)
W. M. Pollock, Buckhannon, W. Va., 189 specimens. (Gift.)
J. Fowler, Kingston, Ontario, Canada, 660 specimens. (Gift.)
W. M. Van Sickle, West New York, N. J., 469 specimens. (Gift.)
E. E. Gayle, Portland, Me., 145 specimens. (Gift.)
Aven Nelson, Laramie, Wyo., 620 specimens. (Gift.)
D. Leroy Topping, Washington, D. C., 74 specimens. (Gift.)
Thomas Howell, Clackamas, Oreg., 43 specimens. (Gift.)
G. V. Nash, New York City, N. Y., 800 specimens. (Purchase.)
John Donnell Smith, Baltimore, Md., 500 specimens. (Gift.)
Geological Survey, Ottawa, Canada, 55 specimens. (Gift.)
N. L. Britton, Columbia College, New York, 23 specimens. (Gift.)
A. H. Curtiss, Jacksonville, Fla., 211 specimens. (Purchase.)
University of Tennessee, Knoxville, Tenn., 266 specimens. (Gift.)
C. S. Crandall, Fort Collins, Colo., 564 specimens. (Gift.)
D. E. Palmer, Washington, D. C., 460 specimens. (Purchase.)
W. W. Rowlee, Ithaca, N. Y., 225 specimens. (Gift.)
C. H. Thompson, St. Louis, Mo., 751 specimens. (Purchase.)
J. Medley Wood, Natal, Africa, 116 specimens. (Gift.)
J. B. Leiberg, Hope, Idaho, 681 specimens. (Purchase.)

The space which can be devoted to the herbarium in the Museum is much too small for its proper accommodation. Means have been found, however, for providing a limited amount of additional space, and considerable progress has been made in caring for the collection, as will be seen by the following statement made by Mr. F. V. Coville, the honorary curator. It is especially gratifying to be able to report that the collection is in better condition than at any previous time.

One tower room, 12 by 10 feet, has been fitted up with shelves on four sides. This room is for storing unmounted material. One new balcony has been built, adjoining the main balcony on the south and running at right angles, covering a floor space 6 by 48.5 feet. This has been furnished with long shelves for the distribution of specimens; also an herbarium case extending along its entire length. The case contains eight hundred pigeon-holes, and will hold eighty thousand specimens. This has relieved somewhat the congested condition in the main balcony, although we shall soon need additional space if the present growth of the collection continues.

Much work has been done in readjusting, relabeling, and shifting of the packages of plants. While much remains yet to be done, all parts of the collection are readily accessible to the assistants and to visiting botanists. It is not improper to state here that the collection has never before been in such good condition.

The stamping of the herbarium, which was referred to in last year's report, has extended from the Malvaceæ to the Anacardiaceæ. The number of specimens thus stamped is four thousand. It is very important that the whole collection be stamped as early as possible, but with our present force we are not able to make much progress.

The transportation to the main herbarium of the collection now stored in the south balcony has been continued, although little progress has been made owing to other duties. Six thousand specimens have been transferred. This work ought to be completed during the coming year.

The Department of Agriculture transferred to the Museum in March the collection of algæ, lichens, hepatics, mosses, and ferns. The grasses, coniferæ, and parasitic fungi are still in charge of the Department of Agriculture.

The work of selecting and marking the type specimens in the herbarium has been continued. Thus far nine hundred species have been marked with a type label, indexed, placed in special sheets, and returned to the herbarium.

During the year thirty-six thousand specimens have been stamped and added to the permanent collection. This includes twenty-two thousand which have been mounted during the year and fourteen thousand which were not quite ready for distribution at the end of last year.

There is no exhibition series in this department. The need of still more space for the study series will soon become imperative.

Mr. J. N. Rose, one of the assistant curators, has published a report on Mexican Umbelliferæ, mostly from the State of Oaxaca. This paper contains descriptions of four new genera and twenty-seven new species. Mr. Rose has also published a number of shorter papers containing descriptions of new or rare species. During the year he determined the Polypetalæ of Mr. C. G. Pringle's Mexican collection, continued work upon the collections made by Mr. E. W. Nelson and Dr. Edward Palmer in the same locality, and began a monograph on the Commelinaceæ of the United States. In the latter it is intended to include colored drawings of all the species.

Mr. Charles L. Pollard, assisted by other Washington botanists, has continued his revision of Professor Ward's "Guide to the Flora of Washington and Vicinity." It is hoped that the manuscript will be ready for the printer during the coming winter.

Mr. Coville states that no explorations have been made directly under the auspices of the Museum which resulted in additions to the collections in this department, although important material was obtained by Mr. F. W. True and Dr. Leonhard Stejneger while they were in the service of the United States Fish Commission. Mr. W J McGee, of

the Bureau of American Ethnology, made a small collection in western Sonora, Mexico, and considerable material collected by Mr. J. B. Leiberg, a field agent of the Department of Agriculture, has been received.

Eleven persons have received material for examination or determination during the year, and six specialists, not members of the staff, have prosecuted investigations in the herbarium.

Among those who have rendered valuable service to the department, the following are mentioned by the curator:

Mr. E. G. Baker, of the British Museum, London, England, named and compared specimens with types in the British Museum.

Mr. W. Botting Hemsley, of the Royal Botanic Gardens, Kew, England, critically determined many Umbelliferæ.

Mr. George E. Davenport, of Medford, Mass., critically determined Mexican and Alaskan ferns.

Mr. M. L. Fernald, of Cambridge, Mass., made many critical determinations.

Mr. J. M. Greenman, of Cambridge, Mass., rendered much assistance in determining Mr. Nelson's large collection of Mexican plants.

Mr. George E. Osterhout, of New Windsor, Colo., sent some interesting plants from his State.

Mr. C. G. Pringle, of Charlotte, Vt., furnished many valuable notes and specimens of Mexican Umbelliferæ.

Mr. P. A. Rydberg, of Columbia College, New York City, lent specimens and determined critically a number of large genera, especially *Physalis* and *Potentilla*.

Prof. J. M. Coulter, of the University of Chicago, assisted in the determination of a number of new species of Umbelliferæ.

Mr. W. N. Suksdorf, of White Salmon, Wash., sent specimens of Umbelliferæ.

The material in the herbarium has served as the basis of thirty-seven papers, which have been published during the year by members of the staff and by other collaborators. The titles of these papers appear in the Bibliography (Appendix IV). They include descriptions of six new genera and sixty-seven new species and subspecies.

More than 17,000 specimens were received during the year, the catalogue entries numbering 236.

TRANSFER OF THE NATIONAL HERBARIUM TO THE MUSEUM BUILDING.

When the herbarium was transferred to the National Museum building in 1894, it was with the understanding that the force engaged in caring for the collection should be continued upon the rolls of the Department of Agriculture so long as the appropriations permitted it. The appropriation for the fiscal year ending June 30, 1897, was largely reduced, however, and the Department of Agriculture was obliged to decline to retain these employees on its rolls any longer. It then became necessary for the Museum to ask for an additional appropriation for the maintenance of the herbarium, and this has been provided for in the appropriations for the coming fiscal year. The matter was presented to the Committee on Appropriations by the Assistant Secretary of Agriculture and the Acting Secretary of the Smithsonian Institution. The letters to the committee urging the necessity of action are here presented:

APRIL 22, 1896.

Hon. W. B. ALLISON,

Chairman Committee on Appropriations, United States Senate.

DEAR SIR: In response to your desire, communicated through Mr. Coville, for further information as to the purpose and effect of granting to the National Museum an additional sum of $10,000 for the maintenance of the National Herbarium, I have to reply as follows:

When, nearly two years ago, the Secretary of Agriculture found the Department buildings entirely too small, and it was brought to his attention that a large amount of space was occupied by a collection of plants estimated to be worth $250,000, and liable at any time to be destroyed by fire, arrangements were made with the Smithsonian Institution to house the collection in the fireproof building of the National Museum. The Department agreed to retain on its rolls, so long as the appropriation permitted it, the force of assistants necessary in caring for the collection, but the unexpected reduction in the botanical appropriation, recently made, has forced the Secretary to ask that he be relieved of this charge.

If the proposed appropriation be made, the force of assistants and mounters now engaged in caring for the herbarium in the National Museum building will be transferred to the rolls of that institution, and the places thus made vacant upon the statutory roll in our division of botany will be filled by the transfer of employees now on the botanical lump sum. No new employees will be appointed as a result of the change, and the statutory position of assistant curator will be left vacant during the coming year, either to be abolished in the next agricultural appropriation bill or to be changed to assistant botanist.

Besides the emergency reasons just cited for the transfer of the herbarium, the Department holds that the care of the collection is properly the function of the Smithsonian Institution, but that it should always be open to the botanists of the Department for reference and consultation in any investigation in which they need it. The object, and the sole object, of the proposed change is to place the herbarium in good hands and in its legitimate place, so as to enable the Department to organize all the botanical work on a directly practical basis.

Respectfully,

CHAS. W. DABNEY, JR.,
Assistant Secretary.

N. B.—This letter is written in connection with that of the Acting Secretary of the Smithsonian Institution, dated April 22, 1896, addressed to the Hon. W. B. Allison, Chairman Committee on Appropriations, United States Senate, which is our authority for the above statement with regard to the part to be performed by the National Museum and Smithsonian Institution.

APRIL 22, 1896.

Hon. WILLIAM B. ALLISON,

Chairman Committee on Appropriations, United States Senate.

SIR: I deem it my duty to bring to your attention the fact that unless some special provision is made for its maintenance, the National Herbarium, recently transferred from the care of the Department of Agriculture to that of the Smithsonian Institution, will become comparatively useless.

This is one of the largest collections of American plants in the world, and one of the most important, embracing as it does the collections of all the Government surveys from the time of Fremont and Wilkes to the present day. It contains about two hundred and fifty thousand specimens, mostly American, and constitutes for American botany a consultative library of specimens of the very greatest importance. In it there are many types of American plants not to be found elsewhere, and it is constantly consulted, either personally or through correspondence, by all working botanists in America.

Although the Smithsonian Institution has always been responsible for the administration of this herbarium, it was for many years relieved of the care and expense of this work by the Department of Agriculture. In the fall of 1894, however, the present Secretary, finding himself unable to give it proper accommodation, and also thinking it might suffer destruction if kept longer in a building which is not fireproof, requested the Secretary of this Institution to resume its direct custody; promising, however, that so long as funds should be available for the purpose in the hands of the Department of Agriculture, he would be responsible for its support and maintenance.

The value of the collection was so great that the Secretary did not feel at liberty to refuse to receive it, and it was at once transferred, although at a very great inconvenience, since our Museum building is so crowded that several of its departments were seriously discommoded by the change.

From that time until now the herbarium has been maintained from the appropriation of the Department of Agriculture; but the appropriation for botanical work has been so much decreased by the present Congress, that, as I am informed, this can no longer be done.

The Secretary of Agriculture has already addressed a letter to you, calling your attention to this fact, and suggesting that the sum of $10,000, which was withdrawn from his appropriation, be added to our appropriation, "for the preservation and increase of the collections in the National Museum," in order to provide for the utilization of this great collection of plants.

I need scarcely say to you that the collection is of special importance to the Department of Agriculture, and is necessarily in constant use by many of its staff.

Should this addition to our appropriations not be made, I do not see how it is possible to do more for the herbarium than simply to preserve it from destruction. It can not be kept in such shape that it will be conveniently available for reference; it can not be increased in order to keep pace with the growth of botanical knowledge and the necessities of American botanists and of the Department of Agriculture. Nothing can be done with the great amount of material which is already on hand, which requires special treatment for its preservation and utilization. It will also be impossible to carry on the system of exchange, long practiced, by which not only the National Herbarium but all the herbariums of the country are constantly benefited.

Should the sum of $10,000 be provided, it would be utilized in the first place by the retention of the staff of skilled assistants, clerks, and preparators already engaged upon this work and now on the rolls of the Department of Agriculture. The direct charge of the herbarium would be, as now, in the hands of the Botanist of the Department of Agriculture, who, by permission of the Secretary of Agriculture, serves in this capacity without compensation, with the title of honorary curator in the National Museum. There are also two skilled assistants, one at $1,800 and one at $1,200, and it is desired to add another at $1,500 to take charge of the collection of cryptogamic plants. There is also a typewriter and clerk at $900, one preparator at $720 and three at $600, making in all $7,920.

Supplies and materials for preservation cost annually about $1,000, about $800 of this sum being required for the purchase of paper for mounting and covers.

A certain sum is required each year for the acquisition of new material, the types of new investigations, and the results of explorations of the year. For this a sum of about $750 is required. This would leave a contingent sum of $330.

Should the desired sum be granted, it will be possible to maintain this vast collection, which is of much importance to botanical science, in a manner befitting the dignity of the nation.

I am, sir, with great respect,

G. Brown Goode,
Acting Secretary.

DEPARTMENT OF MINERALS.

Special attention has been given to the work of securing material illustrating the associations, occurrence, and typical development of minerals of specific localities. This has indirectly been the cause of a great increase in the scientific value of the collections during the year. The report of the honorary curator, Prof. F. W. Clarke, states that all the collections show a steady and highly gratifying growth. Three of the accessions comprised material deposited by the Smithsonian Institution for addition to the Lea collection. These included a collection of gems, semi-precious stones, and minerals from the southern states; a nugget of native silver, weighing 448 ounces, from Pinal County, Ariz., and a specimen of green tourmaline—a cut stone weighing 57⅛ carats and valued at $1,500. This material was presented by Dr. L. T. Chamberlain to the Smithsonian Institution, and by the latter deposited in the National Museum. It is another evidence of Dr. Chamberlain's unstinted generosity by which the Museum has benefited so largely in the past.

Of the other accessions by gift the following are deemed worthy of special mention: A collection of minerals from the Copper Queen Mine, Bisbee, Ariz., presented by the Copper Queen Consolidated Mining Company, New York City; specimens of lawsonite from F. L. Ransome, through H. W. Turner, United States Geological Survey; a specimen of lorandite, a new species of mineral, from George L. English & Co., New York City; specimens of Georgia bauxite and associated minerals from the Georgia Bauxite and Mining Company, Linwood, Ga.; a specimen of caswellite, a new species of mineral, from Franklin, N. J., presented by Col. G. Cæsar; a collection of minerals from Marion County, Ark., exhibited at the Cotton States and International Exposition at Atlanta; a collection of distorted selenite crystals and other minerals from Hants County, Nova Scotia, presented by Dr. M. C. Smith, Lynn, Mass., and specimens of quartz crystals, distorted and highly modified, from Arkansas, presented by Charles F. Brown, Hot Springs, Ark. A large slab of agatized wood from Chalcedony Park, Arizona, was deposited by the Drake Company, St. Paul, Minn., and a specimen of thaumasite from a new American locality was purchased from George L. English & Co.

The time of the honorary curator is occupied to so great an extent in connection with his position as chief chemist of the United States Geological Survey that the care of the collections has devolved very largely upon the assistant curator, Mr. Wirt Tassin. The many minor details of installation, consisting of reblocking, mounting, developing crystals, etc., have been carried on continuously, with the result that a marked improvement in the appearance of the collections is noticeable.

An investigation of the minerals of Italian Peak, Colorado, is now in progress, while earlier in the year a large amount of time was spent in the study of comparative mineralogy.

Under the head of explorations mention is made in the curator's report of the material secured by the field parties of the United States Geological Survey, and also of the collections obtained by the assistant curator in the zinc regions of New Jersey. A nearly complete set of the minerals of this region was secured.

Reference to the work of Dr. W. F. Hillebrand, of the United States Geological Survey, who prosecuted certain investigations in the department during the year, will be found in another place.

The honorary curator has published three papers during the period covered by this report.

Among the plans proposed for the future, special reference is made by the curator to the establishment of a series illustrating mineral technology.

Nearly 1,100 specimens were added to the collection. The last catalogue entry in June, 1895, was 83613, and in June, 1896, 83761.

DEPARTMENT OF GEOLOGY.

The number of permanent accessions during the year was eighty-eight, as against seventy-nine for the preceding year. There were also one hundred and sixty "temporary" accessions, consisting of material received for examination and report. This is an increase of thirty-eight over the preceding year. The value of the material received during the year covered by this report is considerably greater than of that received in 1894–95, owing to the character of the specimens obtained by purchase for exhibition at the Cotton States and International Exposition at Atlanta.

Among the important accessions, the following are mentioned by the curator, Dr. George P. Merrill:

(1) Collection of gold and silver minerals, purchased for the Atlanta Exposition. Value, $600.

(2) Two slabs of serpentine marble from Westfield, Mass.; septaria nodules from England; alabaster from Tuscany, and obsidian from Lipari.

(3) A collection of nonmetallic minerals, rocks, etc., and five hundred and six thin sections of iron ores, collected during the work of the Tenth Census, but just turned over to the department by Prof. R. Pumpelly.

(4) One stalactite from the Copper Queen Mine, Bisbee, Ariz. (Purchase.)

(5) Amphora and other vessels of stalagmite from Egypt. (Purchase.)

(6) Collection of one hundred and sixteen specimens of gold and silver ores from North and South Carolina, Georgia, and Alabama, received from the United States Geological Survey.

(7) Collection of rocks and soils from Bermuda. (Gift of Dr. D. W. Prentiss.)

(8) Columnar sandstones from Zittau, Germany. (Gift of A. Kraus, United States consular agent.)

(9) Lithological collections, representing some five hundred specimens, collected in various parts of the United States. (From the United States Geological Survey.)

A portion of the material received during the year was collected by the curator personally.

Regarding the care of the collections, Dr. Merrill says that over six hundred printed labels for the exhibition series have been received from

the printer during the year, and that copy has been prepared for about five hundred more. The card catalogue of the exhibition series has been kept up to date, and a limited number of cubes of building stones have been cut. About two hundred thin sections were prepared, and over three thousand five hundred duplicate specimens identified, labeled, and laid aside for future use. It is proposed to sort out and prepare for distribution all the duplicate material in the storeroom, with a view to utilizing this space for the study series, the latter having outgrown its present accommodations. A large proportion of the exhibition cases in this department are floor uprights, and have no space for storage.

A number of the exhibits require rearranging, but this matter will be deferred until the question of erecting balconies shall have been decided. The exhibition series is fairly well labeled, although many typewritten labels are at present in use.

The investigations of the curator have consisted mainly of studies relating to rock weathering and to the composition, character, and origin of material belonging to the nonmetallic economic series. He has devoted special attention to asbestus, ochres, and soapstones. About fifty analyses have been made in connection with investigations relating to rock weathering and the formation of soils.

A considerable number of specimens, including many thin sections of rocks, have been lent to various persons for study. Reference to these transactions will be found in another place.

Among those whose cooperation has been of value during the present year the name of Mr. F. W. Crosby, of this city, should be mentioned. The department is also indebted to the United States Geological Survey for a large proportion of the most valuable material acquired.

Five papers have been published by Dr. Merrill during the year, three of which appeared in publications of the National Museum.

Regarding the future development of the department, the curator states that the quality of the material in the collections could in many instances be improved by substituting new specimens, but that desirable specimens can, as a rule, be obtained only by purchase or by the employment of a paid collector. Occasionally, however, such specimens are to be secured by exchange.

The present condition of the collections is indicated in the following statement:

The catalogue entries show that one thousand one hundred and sixty-two specimens have been received during the year. This includes both exhibition and study material. It does not, however, include the five hundred and odd microscopic slides, which are never catalogued. Several of the entries are those of collections including from one to several specimens each.

Estimated number of specimens in the collection:

Exhibition series	23,097
Study series	28,911
Microscopic slides	4,700
Duplicates of all kinds	15,541
Total	72,249

The last entry in the catalogue on June 30, 1895, was 62781, and on June 30, 1896, 63469.

DEPARTMENT OF ETHNOLOGY.

The value of the accessions during the fiscal year just closed is not so great as during the previous year, owing to the fact that in 1894–95 a considerable quantity of material was obtained especially for exhibition at the Cotton States and International Exposition at Atlanta. Since the return of these exhibits the curator, Prof. Otis T. Mason, has been occupied in installing such as could be placed upon exhibition, the remainder having been put in storage.

The most important accession of the year was from Dr. J. Walter Fewkes, consisting of more than one thousand five hundred specimens of antiquities from the Pueblo region. This is regarded as the most valuable material ever received by the National Museum from the southwest. An important collection of ethnological specimens was also sent in by Dr. W. L. Abbott. This material was obtained in the Vale of Kashmir. Dr. Washington Matthews, United States Army, presented a small but valuable collection of paints and dyes used by the Navajo Indians, and from the Royal Zoological Museum, Florence, Italy, through Prof. H. H. Giglioli, an interesting series of specimens was received in exchange. Among other accessions the following may be noticed: A collection from New Guinea, made by Dr. A. C. Haddon; a collection of objects designed to illustrate the cannibal ceremonies of the Fort Rupert Indians, made by Dr. Franz Boas; a series of two hundred and six specimens from the Lubny Museum, Poltava, Little Russia; and a small collection obtained by the United States Fish Commission in Alaska.

Upon the return of the collections sent to the Atlanta Exposition, a radical change was necessitated both in the exhibition halls and in the storage rooms. In the chapter entitled "The Development and Arrangement of the Exhibition Series" will be found a paragraph relating to the rearrangement of the halls. In the upper story of the north tower on the west side of the building are stored such objects as can not be arranged in cases or drawers, while in the third story the entire collection of Eskimo costumes, snowshoes, and objects connected with personal adornment and with travel are packed away. In the small room on the lower floor of this tower a large portion of the Dorsey Mohun African collection is stored, together with the collection of breech-loading firearms, the series of foods and medicines, and a number of other objects. The corresponding room in the south tower is filled with swinging screens and unit boxes. All manuscripts, catalogues, drawings, and photographs relating to the collections have been placed in the rooms in the second story of the south tower. The curator states that the material not on exhibition is in better condition than ever before.

The ancient pottery, not including that from the Pueblo region, having been transferred to the department of prehistoric anthropology, the work of preparing, in the northwest court, an exhibit illustrating the life of the Pueblo tribes, has been continued. In this the curator has had the assistance of Dr. J. Walter Fewkes and Mr. Frank Hamilton Cushing.

A great deal of time has been spent in preparing a catalogue of the material received by the department of ethnology during the last fifty years. The task has now been finished. Not every specimen has been catalogued separately, but, in the words of the curator, "every specimen that would seem to have any value in a comprehensive and comparative study." The work of checking off on this catalogue the material sent out by the department, through exchanges with other museums, still remains to be done. A large number of specimens have also been withdrawn from time to time for the purpose of establishing the various sections included under the department of arts and industries. These should be checked off in a similar manner, but in order to perform this task, additional clerical help is needed.

The preparation of a comprehensive work on the practical arts of the American Indians is at present occupying the attention of the curator. He has in view the work of establishing a series of types characterizing the arts practiced in various culture-regions. In this undertaking he is making use not only of the material in the National Museum, but is also utilizing trustworthy data obtained from other sources. A systematic plan has been laid out, and a large number of illustrations have been already prepared.

Under the head of Explorations, and in addition to the valuable material obtained by Dr. Fewkes in Arizona, which has already been referred to, reference should be made to a collection obtained by Mr. James Mooney, illustrating the various phases of life among the Kiowa Indians.

Only a small quantity of material has been sent out for study during the year. It is the effort of the department to induce investigators to conduct their studies in the building, where the student finds many things which would otherwise escape his observation. The curator also is frequently enabled by this method to obtain information from those who have prosecuted extensive investigations along certain lines. In another chapter reference is made to the researches of some of these students. A study of the Eskimo lamp has occupied the attention of the assistant curator, Dr. Walter Hough, for a considerable length of time.

The department has profited by the generous cooperation of many persons. Through the offices of Hon. W. W. Rockhill, Assistant Secretary of State, a large number of specimens have been secured for the Museum, and among others who have rendered service in various ways Mr. W. S. Hill, secretary of the Academy of Sciences, Tacoma, Wash.;

Prof. F. W. Putnam, Cambridge, Mass.; Rev. H. C. Mabie, Boston, Mass., and Dr. Franz Boas, American Museum of Natural History, New York City, should be mentioned.

Four papers based upon Museum material have been published by the curator during the year, and one by the assistant curator. The titles of these are included in the Bibliography (Appendix IV). Six lectures were delivered by Professor Mason at Columbian University on "Primitive arts in their relation to Sociology as illustrated by the collections in the United States National Museum."

Regarding the plans of the curator for the further development of his department, the following paragraphs are quoted from his report:

The curator would respectfully make the following suggestions with regard to the development of the department of ethnology: First, that hereafter collections from the American continent should be made with especial reference to completing, as far as possible, illustrations in things of the technical life of all the principal tribes and families of America. * * * In order to understand the true life of the aboriginal tribes of the Western Hemisphere, this Museum ought to contain a typical specimen from each of them belonging to every one of the great domestic industries; for instance, there should be a model of every kind of house ever lived in by any large number of people on this continent. There ought to be in every one of these collections, in miniature, in picture, or in description, the prevailing and customary furniture of the kitchen, the dining room, the bed room, the living room, and the social gathering room or its equivalent, indoors or out of doors. There should be in picture, in miniature, or in actual specimens, every kind of costume worn by a large number of individuals in every one of these tribes. Of course, it would be impossible to represent, in such a collection, all the little eccentricities of dress among savage people, where great varieties prevail among individuals of the same family. After all, in every tribe there is a composite dress, a dress which would take in pretty much all the dress of the tribe, and of this typical dress there should be in this Museum one example from each tribe.

There should also be gathered the tools used by all those tribes for all sorts of purposes; for pounding, cutting, boring, smoothing, and various other purposes of common use. The metric appliances of all the tribes should be here, and in sufficient numbers to set forth the characteristics of each tribe. There should be a comprehensive series relating to the great industries of their lives; quarrying, mining, fishing, hunting, planting and gleaning, the intermediary arts by which the substances gathered in the primary arts are transferred to the uses of life, and the final arts and activities by which these products of industry are turned into the channels of consumption or enjoyment. Also the apparatus by which substances are moved from place to place upon the backs of men or beasts, whether on land, on water, or on snow. This, of course, would make an ideal collection, but instead of gathering in a desultory way duplicates of material already in hand, the curator is now in possession of information which enables him to say whether a specimen which it is possible to acquire will fill one of the gaps herein indicated, or will add one more to a collection already containing a superabundance of such material.

There were 1,556 entries made in the catalogues during the year, embracing 2,828 specimens.

DEPARTMENT OF PREHISTORIC ANTHROPOLOGY.

The curator, Dr. Thomas Wilson, states that the scientific value of the collections received during the past year compares favorably with

tne genera average of preceding years. He believes that a comparison which takes into account only the *number* of specimens acquired would be of little value, inasmuch as during the preceding year the extensive collection deposited by Dr. Roland Steiner was catalogued, besides several other large lots of material, which resulted altogether in making the year 1894–95 one of the most notable in the history of the department.

The accessions during the year covered by this report embrace another collection of archæological objects from Dr. Roland Steiner; a number of paleolithic implements, fragments of Roman pottery and of Samian ware, fourteen specimens of animal bones, and a skull of a victim of the plague of 1349, from the Horniman Museum, London (exchange); a collection of human skulls and bones from a burial cave near Duffield, Scott County, Va., received from Mr. A. L. Pridemore, Jonesville, Va.; a polished stone implement found near Olympia, Wash., from Mr. R. H. Hannah, of that city; a series of implements obtained from the gravels of the Thames and from the chalk plateau of Kent, England (purchase); a number of specimens from W. P. Damon, West Auburn, Me. (exchange); implements, ornaments, vessels, etc., presented by Mr. Newton H. Chittenden, Mill River, Berkshire County, Mass.; pottery and vessels from mounds in Illinois, Kentucky, and Tennessee, sent by Capt. J. R. Johnson, Pittsburg, Pa., in exchange; large chipped digging implements and other specimens of flint from Kentucky, presented by Mr. Paul Weir, Owensboro, Ky.; three bone whistles from an ancient grave on San Clemente Island, Cal., presented by Mr. J. Neale Plumb.

A collection of more than eight hundred archæological objects from Michigan and Alabama was lent to the department for study and examination by Mr. Percy F. Matthews, Florence, Ala., and Mr. Warren K. Moorehead, Columbus, Ohio, sent a small number of specimens for the same purpose.

The following statement regarding the progress made in caring for the collections is quoted from the report of the curator:

Two additional storerooms have been fitted with shelves during the past year. One, in the south tower, has been utilized for the reception of North American pottery, mostly fragmentary, but still useful for study and exchanges. The other, in the southwest tower, has been filled with pottery from Central and South America, consisting principally of entire vessels.

All the Mexican and part of the Nicaraguan and Costa Rican collections were placed on exhibition, necessitating a rearrangement of the cases already devoted to objects from these countries.

As many as possible of the entire vessels from mound explorations in the United States were also placed on exhibition, and the remainder stored on shelves in the rear of the long wall case at the east end of the hall. All this material was received from the Museum building.

In addition there were packed and sent to storage 71 boxes containing stone implements, fragments of pottery, human bones, etc. These were part of the collections received from the Bureau of Ethnology and were temporarily stored on the floor of the anthropological hall. The aisles and passageways are now entirely clear.

There is no separate study series in this department. The exhibition series is in as good a condition as at any previous time. A series of transparencies, to be placed in the windows of the anthropological hall, is in course of preparation.

A paper on the Swastika sign, by the curator, was published in the Museum Report for 1894. The preparation of several other papers by Dr. Wilson has now been nearly completed. The titles of those published during the year, so far as they are based upon Museum material, are given in the Bibliography (Appendix IV). A number of lectures have also been delivered by the curator.

Mr. John W. Emmert, of Bristol, Tenn., a former employee of the Bureau of Ethnology, and Gen. A. L. Pridemore, of Jonesville, Va., conducted certain explorations, on a small scale, under the auspices of the Museum, and a considerable quantity of material was secured. The curator, also, spent a few days in July, 1895, in exploring caverns in Ross and Hocking counties, Ohio. The time devoted to this work was necessarily very limited, but the observations made show that the caves had never been occupied by man, or that all traces of such occupation have been destroyed or effaced.

Material for study and for the purpose of illustrating lectures has been sent to persons outside the Museum on several occasions during the year, and some of the members of the scientific staff of the Museum have also borrowed material for use in their investigations. Mr. J. D. McGuire, Ellicott City, Md., has studied specimens belonging to the department in connection with the preparation of a paper on prehistoric pipes.

In addition to those whose names have already been mentioned, twelve others are referred to as having cooperated with the department during the year.

The views of the curator with regard to the policy which he believes should be followed in the future are here given:

Within the last ten years the collection in this department has increased from 65,000 to 209,346 specimens. This material is all useful, not to say necessary, in aiding to perfect our knowledge of the origin, growth, and culture of prehistoric man. But to use it for this purpose requires not a change, but an enlargement of the plan heretofore pursued. It is proposed by this enlargement to classify the implements and objects as rigidly and in as much detail as possible. This classification or division should deal with the object, its form, material, and function, and extend to localities, narrowing them as much as possible. This scheme applied, for example, to the State of Pennsylvania, would divide the State into the localities of the Valley of the Delaware and Susquehanna on the east, and on the west the Allegheny and Monongahela rivers, following them and their branches to the head waters, if need be, independent of State lines. In this way it would be possible to compare the implements of these valleys in three different sections of the State and see what differences were manifested. It is hoped, also, that it would be possible to determine the differences in the industry or culture of these localities. The classification of material would probably enable us to assign the stones of which the various implements were made, to their respective quarries and localities. A comparison between the implements of the various localities thus divided would show the commerce, if it did not show the migration, between the various peoples who occupied these localities.

This scheme should be carried out with all the implements and extended to all localities, and they should be described correctly, fully, and in detail, each different kind having two illustrations, one the large and the other the small size, and one or the other of them should have an edge view as well as a side view. When this is done, we shall have a fairly accurate knowledge of the number and kind, with the various differences of form and material, of every implement in the Museum, from every locality.

This can be done only by personal inspection of each object, wherein the cases must be opened and the objects handled and counted as they are segregated and classified. This being accomplished, many of the specimens now encumbering the cases can be retired, and only the type or representative specimen of each class of implements be retained and displayed; the rest of them may be either boxed and stored, or may be made up into sets for exchange. The effect of this would be to reduce the number of objects on display, but, naturally, the best specimens would be chosen, and therefore the beauty and effectiveness of the display would be increased. The specimens should be properly figured and described, either in a guide-book or label, and each implement exhibited would be the representative of a certain number of other implements not in sight. Thus, they would stand as though the entire number were on display, and the gorging process now going on would be materially relieved.

We have, during the existence of the Museum, been preparing for this classification and enumeration by the acceptance of all kinds of implements in as great a number as was obtainable. No fault is found, or to be found, with the policy by which this great aggregation of the commoner implements was made. It was necessary for the purpose indicated; it is still necessary, and should be continued until the plan herein suggested shall have been carried out.

There were 5,826 specimens received during the year, the total number now in the department being 209,346. The last catalogue entry in June, 1895, was 172315, and in June, 1896, 173061.

DEPARTMENT OF ARTS AND INDUSTRIES.

Technological collections.—Although the number of accessions was not large, several very interesting series and single specimens were added during the year. A collection of models illustrating the various methods of land transportation, and incidentally the development of the wheel, was prepared for the Atlanta Exposition, and installed in the Museum after its return to Washington. This series embraces thirty-nine models, and includes also a number of lithographs and photographs of foreign and American vehicles. The electrical collection was enriched by the Western Union Telegraph Company, which deposited the original of the first instrument used to record a message transmitted to a distant point by means of electricity. Models illustrating two electrical wheels, made by Benjamin Franklin in 1748 and described in his autobiography, were constructed. Mr. Edward L. Morse deposited various decorations conferred by foreign sovereigns upon his father.

A fine specimen of balsa, used by the Seri Indians, was received from the Bureau of Ethnology, through Mr. W J McGee, who collected it in Socorro, Mexico. This specimen was added to the collection illustrative of naval architecture. Among the models of steamboats

prepared for the Atlanta Exposition and now installed in the Museum halls, is a series showing early experiments in steam navigation, including models of steamboats made by Fitch, Rumsey, Fulton, Stevens, and Ericsson. A complete model of the steamship *Savannah* was built under the supervision of Capt. J. W. Collins. In the cases containing these models are also exhibited important historical relics relating to the vessels themselves.

A valuable series of tanned skins of animals, collected in Panama by Mr. R. T. Hill, of the United States Geological Survey, was added to the collection of animal products.

Regarding the progress made in caring for the various collections, the following is quoted from the report of the curator, Mr. J. E. Watkins:

The collection of boats has been overhauled, and a number of models repaired. The full-sized boats—kaiaks, dug-outs, etc.—have been rearranged upon the ceiling of the hall to a height great enough to admit an additional amount of light.

Two new cases have been erected in the east hall, and in them the collection illustrating the electrical industries and the collection illustrating methods of land transportation, which was received at the close of the Atlanta Exposition, have been installed.

The textile collection, which has been scattered for a number of years, has been brought together with a view to revising it and reinstalling such portions as may be deemed advisable.

The collection of animal products was not put under the care of the curator until some weeks after the death of Mr. R. Edward Earll, which occurred in March last, and since that time it has not been possible to give very much attention to the collection.

The following statement shows the number of specimens received during the year, the number of catalogue entries made during the same period, and the total number of specimens in the collection:

Name of collection.	Specimens received during 1895–96.	Total number of specimens in collection.	Last catalogue entry June 30, 1895, and June 30, 1896.
Transportation	112	1,911	181250
			181362
Naval architecture	12	1,331	163090
			164002
Animal products	11	3,039	105071
			105082
Textiles	.....	4,942	.....
Paints and dyes	.....	197	.....
Foods	.....	1,114	.....
Oils and gums	.....	1,112	.....
Chemical products	.....		.....

The graphic arts collection.—Owing to the absence of the curator, Mr. S. R. Koehler, during a considerable portion of the preceding fiscal year, and also during the first half of the year covered by this report, comparatively little has been done toward the development of the

collection. The most interesting addition was a "photo-autocopyist" outfit, illustrating a method of printing from gelatinized parchment. Fifty-nine specimens were received during the year, most of these having been obtained by the curator during his recent trip to Europe. Eighteen specimens of half-tone work in black and in colors were presented by Messrs. John Swain & Son, London. Mr. N. S. Amstutz, who during the preceding year presented a number of copies of photographs transmitted by means of electricity, has offered to donate some models of machinery used by himself.

Regarding the condition of the collection the curator says:

The specimens on exhibition speak for themselves. They present the best illustration of the technical development of the reproductive or multiplying arts to be found on exhibition anywhere, whether here or in Europe. It is not intended to imply, however, that the collection is complete. The division illustrating the various methods of drawing and painting is still very incomplete, although full of interest even in its present state. In the division illustrating the application of printing to the industrial arts, only a beginning has been made.

A "study series" hardly exists, the specimens in the storage cases being mostly of a kind similar to those on exhibition. The collection of patents might be made useful to students, or rather to seekers of information of a practical kind, but it has been almost abandoned, for the present at least, and under the prevailing condition of things it is inaccessible to the public.

The collection has now reached such a stage that, according to the curator, it is impossible to make satisfactory progress without the expenditure of considerable money in the purchase of specimens; and even if funds were available for this purpose, lack of room would seriously hamper the efforts of the curator.

Mr. Koehler refers to this matter in the following language:

The section of graphic arts has reached a point where it must rest, unless it is supplied more liberally with money. The ground to be covered is as well covered as the facilities so far furnished will permit. The collections need piecing out in many places, and it is very desirable, also, that some of the specimens now on exhibition should be replaced by better ones. But this can be done only by the aid of money.

The above applies more especially to the illustrations of the reproductive or multiplying arts. The development of the collection illustrating the methods of drawing and painting must be left to the future. To make it what it might be or ought to be, would cost altogether too much money to allow it to be thought of at present.

Whether it is worth while to continue the effort to illustrate the applications of painting in the industrial arts may remain an open question. With a proper expenditure of time and of money, much interesting material could probably be obtained for this department from manufacturers. But as there is no room to exhibit the specimens that might be thus obtained, it would be useless to make further efforts in this direction, even if the money needed were available, until the erection of a new building will permit of an enlargement of the section of graphic arts.

After the reconstruction above outlined, of the division embracing the reproductive or multiplying arts, which is and will probably always remain the main division of the section, the preparation of a handbook will be in order. Several beginnings toward such a handbook have been made, but they had to be abandoned, as the collections were too incomplete and the changes in them too rapid to make it likely that a handbook fitting them would have permanent value.

The number of the last catalogue entry on June 30, 1895, was 5561, and on June 30, 1896, 5620. The total number of specimens now in the collection, not including duplicates, is 5,620.

The collections of oriental antiquities and religious ceremonial objects.—The collection of oriental antiquities is under the honorary curatorship of Dr. Paul Haupt, while Dr. Cyrus Adler occupies the position of assistant curator and is also custodian of the collection of religious ceremonial objects. There were twenty-eight accessions during the year, this being more than three times the number for the preceding year. A collection of facsimiles of important codices of the Bible, historical editions, and manuscripts was acquired by purchase. Twelve manuscripts and editions of the Bible were deposited by Dr. Adler and three by Dr. Goode. A series of Hittite casts was purchased; also a cast of a human-headed winged bull, and one of a lion.

A collection of musical instruments, coins, and gems referred to in the Bible has been formed from material transferred from other departments in the Museum.

A series of carved ivory plaques was obtained, in exchange, from Prof. H. H. Giglioli, director of the Royal Zoological Museum, Florence, Italy; and specimens of pottery from the Cotton Grotto at Jerusalem were presented by Dr. Adler. The accessions also included twenty-six photographs from Miss E. R. Scidmore, Washington, D. C.; a Bible from Dr. S. M. Burnett; seven marble fragments of Greek mythological figures from Professor Jerichau, Washington, D. C.; and two Bibles from Dr. I. M. Casanowicz, of the United States National Museum. A model of a Babylonian temple tower was made in the Museum.

An exhibit of biblical objects, comprising about two hundred and fifty specimens, was prepared for the Cotton States and International Exposition at Atlanta. This is described more in detail in a paper published in Part II of this volume, in which the results of recent discoveries and researches in the domain of biblical and oriental archæology are also discussed.

The various objects received during the year have been placed upon exhibition, and the present arrangement of the collection is set forth in the chapter on the "Development and Arrangement of the Exhibition Series."

A study of Assyrian and Babylonian seals, based upon the collections in the Museum, has been begun by Dr. Adler, and two papers based upon Museum material have been published by him during the year.

It is proposed to rearrange the Jewish and Mohammedan collections and to rearrange, classify, and complete the installation of the collections illustrating the religions of Eastern Asia.

The total number of specimens now in the collection is 3,020, of which 300 were received during the year just closed. The last catalogue entry in June, 1895, was 154990, and in June, 1896, 155122.

Historical collections, coins, and medals.—Among the most interesting accessions the following are mentioned by Mr. A. Howard Clark, custodian: From W. Du Val Brown, Washington, D. C., a sword, belt, and buckle presented to Maj. Gen. Jacob Brown by the State of New York, a gold snuffbox presented by the corporation of the city of New York, and a gold medal presented by the Congress of the United States for valiant services at the battles of Chippewa, Niagara, and Erie in 1814 (deposit); from Mrs. Abner Doubleday, Washington, D. C., the garrison flag of Fort Moultrie (loan); from Lieut. Frank E. Brownell, a revolver, cap ornament, and scarf pin owned by the late Col. E. E. Ellsworth, a gold medal presented to Lieutenant Brownell by the citizens of Troy, a medal of honor presented by Congress, a medal containing a piece of the Marshall House flag, a badge of the Society of the Army of the Potomac, a dagger presented by the citizens of Boston, and a revolver presented by the New York Board of Brokers (deposit); from Dr. A. Fényes, Hélouan, Egypt, Grecian and Roman silver and copper coins; from N. L. Griswold, Peoria, Ill., United States land patent signed by President James Monroe in the year 1817 (gift); from J. W. Hiatt, New Harmony, Ind., photographs of Robert Owen, David Owen, William McClure, Thomas Say, and the building of the Workingmen's Institute (gift); from George F. Kunz, New York City, a brass badge of the Eighteenth Hussars (gift); from Miss S. W. Turner, Washington, D. C., two ancient Greek coins and an icon (gift); and from the Treasury Department a collection of national medals struck at the United States Mint, Philadelphia, forming a portion of the exhibit of the Treasury Department at the Atlanta Exposition (deposit).

There were also received from the city council of Philadelphia a liberty-bell medal and council badge, used on the occasion of the journey of the bell to the Atlanta Exposition (gift); from the Natural History Society of New Brunswick, St. John, New Brunswick, photographs of Abraham Gesner and Moses H. Perley (gift); from John Laun, Petersburg, Va., a silver watch (gift); from Dr. Cyrus Adler, Smithsonian Institution, a Bulgarian coin (gift); from the National Society of the Daughters of the American Revolution, a silver ink tray brought to America in 1676 by J. Frye and supposed to be of early Saxon make, a leather wallet used by Maj. Ebenezer Frye, a Washington badge, three Lafayette medals in bronze, a silver spoon made from knee buckles worn by Bvt. Col. Ephraim Sawyer, of Lancaster, Mass., and a badge and souvenir gold spoon of the Daughters of the American Revolution (deposit).

Musical instruments.—The accessions for the year include six musical instruments obtained in exchange from the Lubny Museum, Poltava, Little Russia; instruments from Borneo and other localities, acquired through exchange with Mrs. J. Crosby Brown; a virginal from Italy, secured by purchase; five musical instruments presented by Dr. William L. Abbott, Bombay, India; a single-headed drum from the island

of Gilolo, and a three-jointed trombone from Sumatra, obtained in exchange from Mr. M. F. Savage, New York City; a small bird-shaped earthenware whistle, presented by Hon. W. W. Rockhill, Assistant Secretary of State; and a musical instrument transmitted by Mr. E. O. Schuyler, New York City, in exchange.

There were 43 entries made in the catalogue during the year, embracing the same number of specimens. The entire number of instruments in the collection is now more than 1,300.

Materia medica.—Owing to the rearrangement of the collections in some of the exhibition halls and the temporary removal of the cases containing these exhibits, the materia medica collection was rendered unavailable for exhibition purposes during the greater part of the year. No special effort to increase the collection was made, therefore, by the honorary curator, Dr. J. M. Flint, U. S. N., and his efforts therefore have been largely directed to the care and preservation of the specimens already on hand, and the routine work of the office incident thereto.

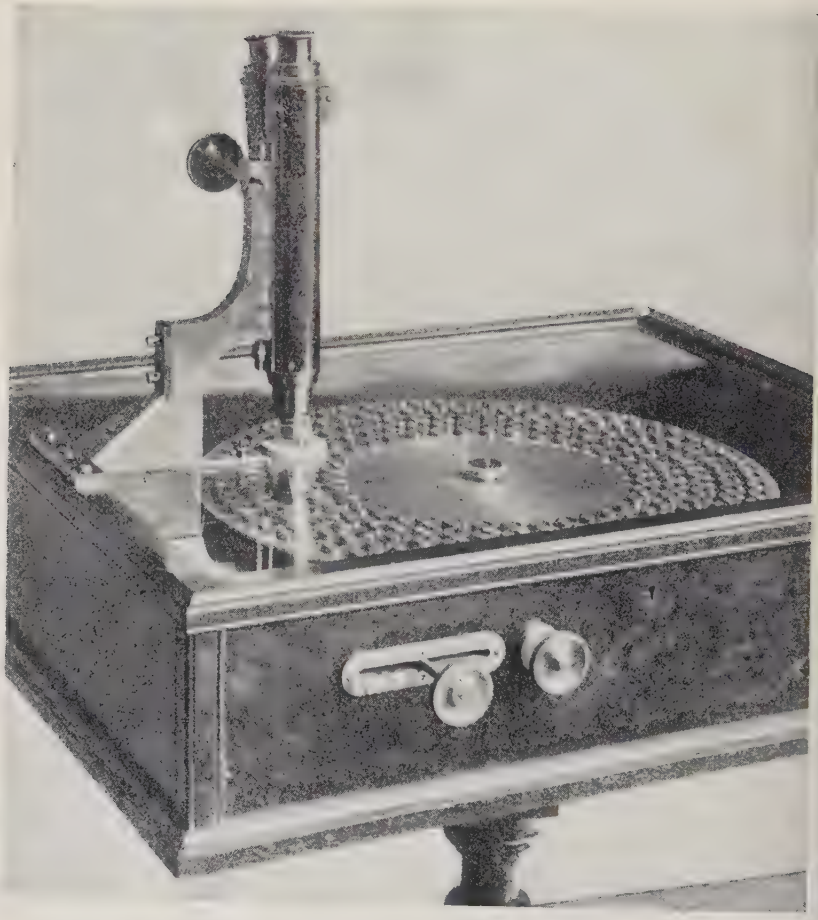
This temporary diminution of active work in this section allowed the curator to devote some time to microscopic work, in which he has for many years been interested, and in this connection he paid special attention to identifying, mounting, and arranging for exhibition a series of Foraminifera for the department of marine invertebrates. A paper, by the curator, describing a large number of species of Foraminifera, is being prepared by Dr. Flint for publication by the Museum.

Coincident with his microscopical studies the curator has devised a plan for exhibiting microscopical objects not requiring the use of very high magnifying powers. The instruments used are shown in plates 1–4, and they are best described in Dr. Flint's own words:

> The following description and illustrations of apparatus for public exhibition of microscopic objects are presented as being pertinent to the subject of the installation of museum exhibits. The apparatus described is believed to be the first practically successful attempt to make a series of such objects available for examination by the public, without extravagant expense or extreme watchfulness.
>
> The first appliance for this purpose, devised by the writer, was an accessory to the ordinary microscope stand. It consisted of a circular plate of pasteboard made to revolve upon a pivot attached to the stage, the plate carrying a series of objects mounted upon small disks or small squares of glass (Plate 1). This accessory was made in 1885, and described in the American Monthly Microscopical Journal for November of that year.
>
> This arrangement was only suitable for class use under the immediate supervision of the instructor. For public use the principle of the rotary stage has been developed by enlarging the circular plate, inclosing it securely in a box with a glass top upon which the microscope is fastened, giving a rotary motion to the stage by means of a friction roller operated by a milled head on the outside of the box, and a to-and-fro movement effected by a rack and pinion controlled by another milled head in close proximity to the former. By a combination of the two movements any portion of the plate may be brought under the microscope, and any number of objects arranged thereon be brought into the field in succession. The objects being inclosed in the box are secure from injury; the movement of the microscope for focal adjustment is limited by stops so that the object can not be entirely lost to view; the eyepieces are screwed in so that they can not be stolen, and the instrument is practi-

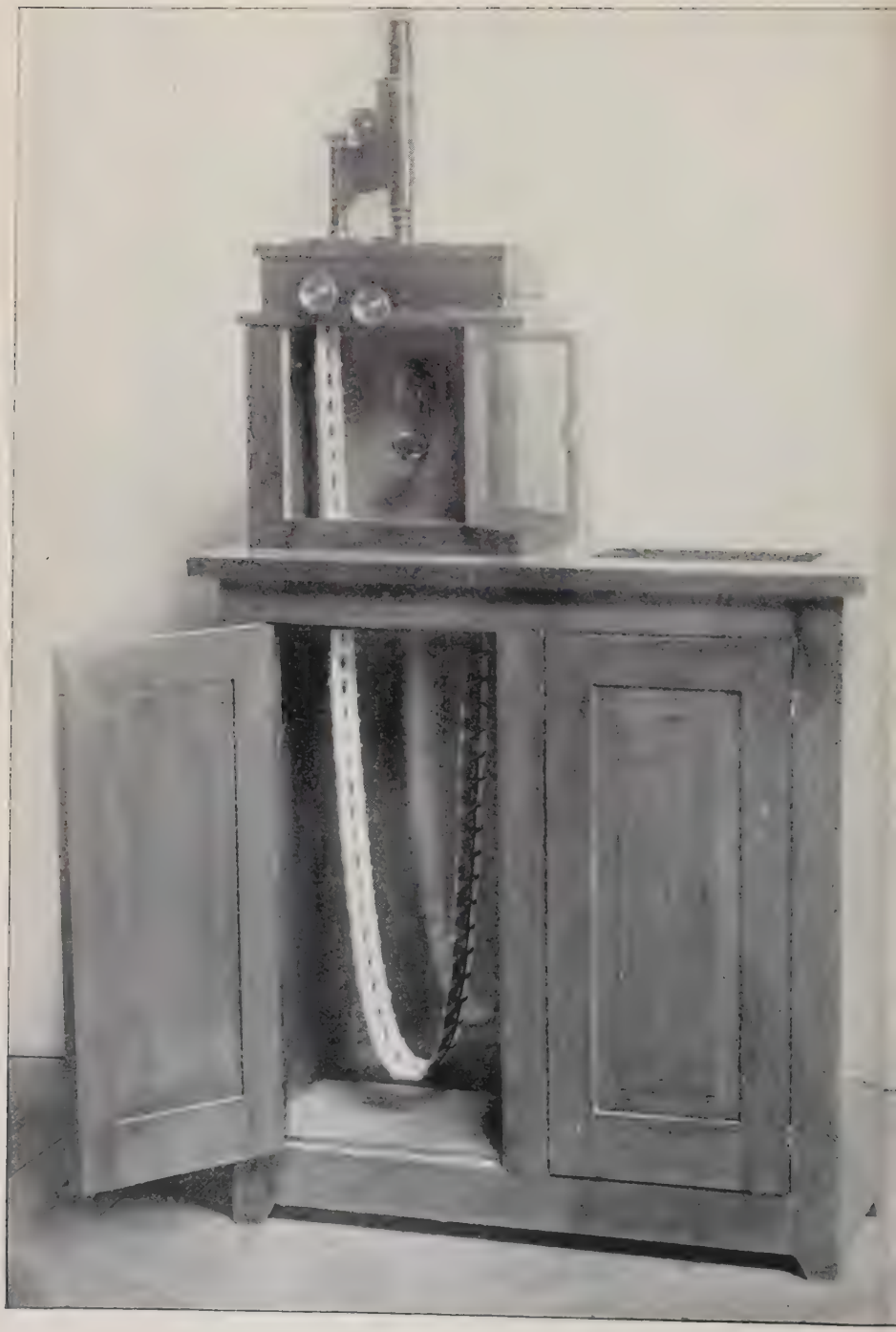
CLASS MICROSCOPE.

FOR EXPLANATION OF PLATE SEE PAGE 96.



CLASS MICROSCOPE.

FOR EXPLANATION OF PLATE SEE PAGE 97.



CLASS MICROSCOPE.

FOR EXPLANATION OF PLATE SEE PAGE 97.

CLASS MICROSCOPE.

FOR EXPLANATION OF PLATE SEE PAGE 97.

cally safe from everything but malicious mischief. Special mounts are required in order to increase the carrying capacity of the stage, and for transparent objects the stage must be perforated in order that the light may pass upward from the reflector below. The instrument now in use in the Museum (Plate 2) was made in the year 1890, has been modified in a few details since, and has successfully endured manipulation by thousands of inexpert hands—of children as well as adults—without injury, and this without attendant supervision of any kind.

For the purpose of exhibiting a series of preparations mounted in the usual way upon glass slips or "slides," an entirely different form of apparatus has been devised (Plates 3 and 4). An indefinite number of slides—from 10 to 100—are attached to an endless band of linen by means of thin brass holders which allow the slides to be changed when desired. This linen band passes over two rollers mounted upon a light brass frame which occupies the place of the "stage" of an ordinary microscope. The loops of the band hang free. One of the rollers has a projecting pivot with a milled head by means of which it may be rotated, and the two rollers are connected by a narrow belt at each end. As the rollers are made to revolve, the band carrying the slides passes horizontally under the microscope, resting meanwhile upon the two narrow belts and being kept at a definite distance from the objective of the microscope by two guides, which press upon the slides from above. The brass frame rests upon a grooved bed-plate which permits a lateral movement of the frame. This lateral motion is controlled by a screw operated by means of a second milled head in convenient proximity to the one giving the to-and-fro motion. As in the other instrument, the specimens and nearly all parts of the mechanism are inclosed in a box secured by a lock, the only exposed parts being the microscope and the two milled heads controlling the motion of the slides. The advantages of this form of apparatus are that the usual glass slide, 3 inches long by 1 inch wide, upon which microscopic objects are usually mounted, may be used, and especially that the focal distance is not disturbed by differences in thickness of the glass slides. The only disadvantage is that the mechanism is somewhat more delicate and complicated than in the other instrument and requires some little protection from the thoughtless violence of curious children. Microscopes copied from the original here described have been in use for several years, and no irremediable difficulties have been found in the way of their perfectly successful operation.

It is safe to say, from present experience, that these methods of installation of microscopic exhibits promise to open a new and interesting field of observation and study to museum visitors.

Physical apparatus.—Mr. W. C. Winlock remains in charge of this section as honorary curator. During the year there were deposited in the Museum by the Smithsonian Institution twelve pieces of electrical apparatus supposed to have been used by Professor Henry in his laboratory work at the Institution; also sixteen photographs of early electrical apparatus. These photographs were made under the direction of Miss Henry and were exhibited at the World's Columbian Exposition in 1893. A number of pieces of apparatus were purchased by the Smithsonian Institution and deposited in the Museum, including a pocket dial with compass, five sand-glasses, a Japanese clock, an iron clock dial, a hexagonal clock with three dials, and an hour-glass.

IV.—REVIEW OF WORK IN THE ADMINISTRATIVE DEPARTMENTS.

FINANCE, PROPERTY, SUPPLIES, AND ACCOUNTS.

In Appendix VIII will be found a statement showing the amount of the appropriations for the fiscal year ending June 30, 1896, the disbursements under said appropriations, and the disposition of the unexpended balances remaining on hand from the appropriations of previous years. These statements are taken from the report of the chief clerk, Mr. W. V. Cox.

The routine work of the office, consisting of the preparation of financial statements, of orders for the purchase of supplies and for the performance of services, the approval and registration of requisitions for supplies, the examination of vouchers, etc., has been carried on. More than 1,500 letters were prepared.

The preparation of a suitable subject index to the letters sent from this office since 1885 was also taken up during the year. Seventeen thousand pages have been indexed on slips and are now being arranged for revision, after which they will be transcribed on cards for permanent reference. A complete record, on index cards, of all legislative matters of interest to the Institution has also been kept.

The building at the corner of Third and B streets, S. W., used for workshops and storage for the Museum, did not prove satisfactory for the purpose required, and a large warehouse on Ninth street, about three squares south of the Museum, was leased instead.

Congress having made an appropriation of $800 for the better protection of the Smithsonian and Museum buildings from fire, four new hydrants were placed in position during the year and a quantity of new hose purchased. The hydrants were put in under the supervision of the engineer department of the District of Columbia. As an additional safeguard, a number of fire extinguishers has been procured, and the watch force is drilled regularly in fire duty.

A granito floor was laid in the exhibition hall of the department of comparative anatomy, and a mosaic floor in the vestibule at the north entrance of the Museum building.

In connection with the Cotton States and International Exposition at Atlanta, Ga., there were issued a large number of orders for the purchase of material and for services. Nearly three hundred accounts were audited for payment, involving expenditures amounting to $24,246.73, and more than three hundred letters were written. All claims on account of the Museum exhibit have been settled, with a

balance of $3.27 remaining from the allotment of $24,250 for the preparation, installation, maintenance, and return of the exhibit.

Mr. Cox assumed charge of the exhibit at Atlanta from November 9 to December 10, 1895, during the absence of Mr. R. E. Earll.

CORRESPONDENCE AND REPORTS.

This division remains under the charge of Mr. R. I. Geare. The office force includes two stenographers, one accession clerk, four index and record clerks, one file clerk, one compiler and proof reader, two typewriters, and one messenger. The technical correspondence of the Museum has steadily increased each year, and in 1895–96 more than 12,000 letters and other official papers were prepared in this office. The formal acknowledgment of, and official correspondence connected with, accessions to the Museum collections forms a special feature. This division is also charged with the preparation and proof reading of the administrative portion of the Annual Report of the Museum and the proof reading and general editorial supervision of the papers in the Appendix. For several years also the distribution of all Museum publications has formed part of the work of this office. This entails a large amount of routine work, such as the preparation of labels, the revision of the mailing lists, etc. As a rule, about 15,000 volumes and 40,000 separates are distributed each year to libraries and individuals on the regular mailing lists. In addition, 3,000 to 4,000 applications for special papers and volumes are received annually.

During the year were distributed the Report of the Museum for 1893, Volume XVII of Proceedings of the National Museum, the separate papers in Volume XVIII (No. 1033 to 1082, excepting three papers which were delayed), and the last paper (No. 1032) in Volume XVII. Advance sheets of two papers containing descriptions of remarkable new genera and species of batrachians and crustaceans obtained by the United States Fish Commission from an artesian well at San Marcos, Tex., and a third, containing preliminary diagnoses of new mammals from the Mexican border of the United States, collected by Dr. E. A. Mearns, United States Army, of the International Boundary Commission, have been printed and distributed. These papers will appear in Volume XVIII of Proceedings.

A supplemental edition of Part "F" of Bulletin No. 39, "Directions for Collecting and Preserving Insects," by the late Prof. C. V. Riley, was received from the printer in September, and hardly a day passes in which several requests for it are not received; nearly 4,000 copies have been already distributed.

Circular No. 47 was issued during the year. The purpose of this pamphlet is to specify the conditions upon which the Museum will undertake the examination of mollusks sent for identification. The sending of material of this kind to the Museum has increased very greatly during recent years, and as in almost every instance its return

was expected, the curator of the department of mollusks found it very desirable to at least impose certain conditions upon persons desiring to obtain expert determinations from the Museum in this direction.

Special effort is now being directed to the work of revising the mailing lists.

The list of libraries is being carefully scrutinized with a view to utilizing the small editions to the best advantage. It is proposed to include libraries which have attained to the number of 10,000 volumes since the list was first prepared, as well as to insure the representation on the list of all towns which contain more than 10,000 inhabitants.

REGISTRATION AND DISTRIBUTION.

The registrar, Mr. S. C. Brown, states that there were received during the year 25,249 packages of all kinds, including material for addition to the collections, publications, and supplies.

There were 3,195 packages sent out, of which 637 contained specimens transmitted to educational institutions as gifts, or sent to individuals or institutions in exchange or for study. A few specimens returned to owners are also included in this number. The entries made on the incoming transportation record numbered 2,910 and on the outgoing transportation record 1,487, there being an increase of about 250 entries in the case of the former record and of more than 700 in the latter.

The number of accessions or "lots" of material received was 1,299, an increase of 76 over the record for the preceding year. There was also an increase of 75 in the "temporary" accessions, consisting of material received for identification, the total for the present year having been 542. About 27,000 specimens of all kinds have been sent out as gifts or in exchange, and about 3,000 specimens have been lent for study.

Of the entire number of objects donated to educational establishments perhaps two-thirds consisted of fishes and marine invertebrates. The remainder was composed largely of geological specimens and casts of prehistoric implements.

Several special collections of fishes were prepared in the fall of 1895 from material received from the United States Fish Commission. These were transmitted to the following institutions: Oberlin College, Oberlin, Ohio; State Normal School, Mankato, Minn.; High School, Duluth, Minn.; Arkansas Industrial University, Fayetteville, Ark.; University of Nebraska, Lincoln, Nebr.; Iowa State University, Iowa City, Iowa; Indiana University, Bloomington, Ind.; Museum of Comparative Zoology, Cambridge, Mass.; Leland Stanford Junior University, Stanford University, Cal.

A few months later eight special collections of fishes, prepared from specimens obtained by the United States Fish Commission in the North Pacific Ocean and Bering Sea, were sent to the following establish-

ments: Royal Zoological Museum, Berlin, Germany; Museum of Natural History, Paris, France; British Museum (Natural History), London, England; Zoological Museum, Christiania, Norway; Imperial Zoological Museum, Vienna, Austria; University of Indiana, Bloomington, Ind.; Museum of Comparative Zoology, Cambridge, Mass.; University of Washington, Seattle, Wash.

The storage record shows that 305 packages were placed in storage, while 143 were withdrawn.

In Appendix IX will be found a statement, arranged geographically, showing in detail to what individuals and institutions specimens have been sent during the year, either in exchange, as gifts, or for study.

The number of lots of specimens sent out is here shown:

United States:	
Alabama	1
Arkansas	3
California	10
Colorado	5
Connecticut	1
Dakota	1
District of Columbia	12
Georgia	5
Idaho	2
Illinois	6
Indiana	4
Iowa	9
Kansas	4
Kentucky	1
Louisiana	1
Maine	4
Maryland	5
Massachusetts	15
Michigan	4
Minnesota	5
Missouri	1
Montana	2
Nebraska	2
New Jersey	2
New Mexico	1
New York	33
Ohio	8
Oregon	2
Pennsylvania	19
Rhode Island	3
United States—Continued.	
South Carolina	2
Texas	2
Virginia	2
Washington	6
Wisconsin	4
Foreign countries:	
Argentina	1
Asia	1
Australia	7
Austria	3
Belgium	1
Brazil	2
Canada	9
Chile	1
Denmark	2
England	12
France	5
Germany	5
Hungary	1
Italy	6
Jamaica	1
New Brunswick	1
Norway	2
Nova Scotia	1
Russia	1
Scotland	1
Sweden	2
Total	252

The following table shows the number of specimens distributed by the various departments during the year covered by this report, either as gifts or in exchange:

Department.	Specimens.
Historical relics, coins, and medals	17
Musical instruments	8
Ethnology	176
Prehistoric anthropology	1,408
Mammals	264
Birds	380
Birds' eggs	21
Fishes	14,630
Mollusks	599
Insects	407
Marine invertebrates	4,702
Comparative anatomy	3
Fossils	1,559
Botany	805
Minerals	348
Geology	2,373
Total	27,700

BUILDINGS AND LABOR.

In Appendix x a condensed statement is presented, showing in a general way the character of the work performed during the year by the mechanics and laborers, under the supervision of Mr. Henry Horan. The report of the latter also contains statements showing the amount of fuel, gas, and ice consumed, the cost of supplies purchased for the department of buildings and labor, and the many items of work performed in addition to those mentioned in the appendix.

WORK OF THE MUSEUM PREPARATORS.

TAXIDERMISTS.

Mr. William Palmer continues to fill the position of chief taxidermist. He reports that five mammals were mounted during the year, three of them being intended for exhibition at the Cotton States and International Exposition at Atlanta. Thirty-seven mammals were cleaned for this exhibit, and several were placed upon new stands. The groups of Rocky Mountain sheep and goats were dismounted and packed for shipment to Atlanta.

In addition to the exposition work above mentioned, ten specimens were cleaned, poisoned, and placed upon new stands.

During the year ninety mammals were received and skinned. Of this number more than one-half came from the National Zoological Park, as will be seen from the following table:

Mammals received in the flesh.

	From the Zoological Park.	From other sources.
Primates	12	1
Carnivora	18	3
Ungulata	12	1
Chiroptera	.....	16
Rodentia	8	13
Insectivora	.....	4
Marsupialia	2	.....
Total	52	38

In addition, thirty-seven specimens of mammals, birds, reptiles, etc., were received from the Zoological Park and transferred immediately to other departments in the Museum.

Many of the bodies of the mammals skinned were turned over to the Bureau of Animal Industry, Department of Agriculture, for examination as to the cause of death, and for the purpose of ascertaining if they contained parasites. A few were sent to the Army Medical Museum, and others were retained by the department of comparative anatomy in the National Museum.

A large number of skins were received to be remade, mounted, etc. Some of these were dry, while others were fresh or salted.

Number of skins received.

	Museum collection.	Department of Agriculture collection.
Primates	22	13
Carnivora	19	29
Ungulata	39	24
Rodentia	7	2
Insectivora	1	.....
Edentata	1	3
Marsupialia	.....	16
Total	89	87

Fifty-five skins were prepared for the collection of the Department of Agriculture and 172 were prepared for the study series of the Museum, as shown in the following table:

Skins made up for the study series.

	Museum collection.	Department of Agriculture collection.
Primates	43	.....
Ungulata	27	5
Carnivora	42	29
Chiroptera	13	.....
Rodentia	30	2
Edentata	5	3
Insectivora	6	16
Total	172	55

The number of skins remaining on hand June 30, 1896, was 453, as shown below:

	Museum collection.	Department of Agriculture collection.
Primates	21	13
Carnivora	216	.....
Ungulata	125	19
Rodentia	38	.....
Chiroptera	6	.....
Sirenia	1	.....
Marsupialia	14	.....
Total	421	32

Of the large amount of miscellaneous work performed during the year the following items may be mentioned: Sixteen seal skins and a number of other large skins were cleaned preparatory to mounting; an antelope and several smaller mammals were mounted, although not entirely finished; a large sea lion was skinned; more than one hundred mounted mammals were crated, with a view to placing them in storage, and a large model of the National Zoological Park was made.

Casts were made of the following objects: Nine Egyptian inscriptions, two gold ornaments for the new Congressional Library building, two lizards, and a stone tablet.

Mr. Joseph Palmer was engaged for nearly the entire year on work for other departments in the Museum and for the Atlanta Exposition.

Mr. Henry Marshall, taxidermist of the department of birds, cleaned and renovated about 700 specimens in the exhibition series. Although this is a much smaller number than was attended to last year, the

decrease is readily explained by the fact that the birds now being cleaned are larger and require a greater amount of care and labor. Four birds were mounted, and several poorly mounted specimens were reduced to skins. Twenty-seven birds, received in the flesh, including two young ostriches, were skinned for the study series.

OSTEOLOGIST.

There were cleaned for the department of mammals during the year 607 skulls, and for the Department of Agriculture 539 skulls (many of them being of the larger mammals), making a total of 1,146. Thirty-two other specimens were also cleaned, 29 of them having been received in the flesh. Eighteen specimens were mounted, exclusive of the work done for the exhibit at the Cotton States and International Exposition at Atlanta. Reference was made last year to the preparation of a skeleton of Zeuglodon for this exhibit. This work was completed, and several other skeletons were prepared for the same purpose.

The synoptic series of invertebrates and the series of wax models showing the development, from the embryo, of the trout, frog, chicken, etc., were packed up and sent to Atlanta. This work required exceptional care, owing to the nature of the specimens. Considerable time was necessarily spent in repacking the material for return to Washington at the close of the Exposition, and in installing it in the Museum.

A summary of the osteological work is given in the following table:

	Mammals.	Birds.	Reptiles.	Fishes.	Total.
Specimens received in the flesh	9	13	7		29
Cleaned:					
Skeletons	3	6	1		10
Bodies		6			6
Skulls	1,146	1			1,147
Skeletons cleaned and disarticulated	3	13			16
Bodies disarticulated		1			1
Mounted:					
Skeletons	4	5	1	1	11
Skulls	1	1			2
Total	1,166	46	9	1	1,222

The workshops of the osteologist were transferred during the year to the new quarters on Ninth street, S.W., which have been leased by the Museum for storage and other purposes.

PHOTOGRAPHER.

The photographer, Mr. T. W. Smillie, reports that 1,638 negatives have been made during the year. Many of these were for the departments of ethnology, mammals, geology, anthropology, oriental antiquities and religious ceremonials, botany, and technology. In addition,

1,022 platinum prints, 316 silver prints, 321 cyanotypes, and 5 lantern slides were made. Considerable miscellaneous work was also done, such as numbering and filing negatives, testing inks, restoring large pictures for exhibition, and developing negatives brought in by collectors.

COLORIST.

Mr. A. Zeno Shindler has continued the work of cleaning and restoring such of the paintings in the Catlin Indian gallery as required attention. He has also continued work upon the series of paintings representing the races of men, nine pictures having now been completed. In addition, two life-size casts of Indians have been painted, and other incidental work attended to.

APPENDIX I.

The Scientific and Administrative Staff.

[This list is simply a reprint of the list published in the Museum Report for 1895, which was brought down to the actual date of sending the book to press, August 1, 1896.]

Keeper, ex officio,

S. P. Langley, Secretary of the Smithsonian Institution.

Executive Officers.

G. Brown Goode, Assistant Secretary of the Smithsonian Institution, in charge of the U. S. National Museum.
Frederick W. True, Executive Curator.
W. V. Cox, Chief Clerk.

Scientific Staff.

Arts and Industries: G. Brown Goode, Curator.
Historical Collections: A. Howard Clark,[1] Custodian.
Religious Ceremonial Objects: Cyrus Adler,[1] Custodian.
Technological Collections: J. E. Watkins, Curator.
Electrical Collections: George C. Maynard,[1] Custodian.
Graphic Arts: S. R. Koehler, Curator.
Materia Medica: J. M. Flint,[1] United States Navy, Curator.
Forestry: B. E. Fernow,[1] Curator.
Physical Apparatus: W. C. Winlock,[1] Curator.
Ethnology: O. T. Mason, Curator; Walter Hough, Assisant Curator.
Aboriginal Pottery: William H. Holmes,[1] Curator.
Pueblo Collections: F. H. Cushing,[1] Custodian.
Oriental Antiquities: Paul Haupt,[1] Curator; Cyrus Adler,[1] Assistant Curator.
Prehistoric Anthropology: Thomas Wilson, Curator.
Mammals: Frederick W. True, Curator.
Birds: Robert Ridgway, Curator; C. W. Richmond, Assistant Curator.
Birds' Eggs: Charles Bendire,[1] Major, U. S. A. (retired), Curator.
Reptiles and Batrachians: Leonhard Stejneger, Curator.
Fishes: Tarleton H. Bean,[1] Curator; Barton A. Bean, Assistant Curator.
Mollusks: William H. Dall,[1] Curator; C. T. Simpson, Aid; W. B. Marshall, Aid.
Insects: L. O. Howard,[1] Curator; W. H. Ashmead,[1] Custodian of the Collection of Hymenoptera; D. W. Coquillett,[1] Custodian of the Collection of Diptera; O. F. Cook,[1] Custodian of the Collection of Myriapoda; E. A. Schwarz,[1] Custodian of the Collection of Coleopterous Larvæ; M. L. Linell, Aid.
Marine Invertebrates: Richard Rathbun,[1] Curator; J. E. Benedict and Miss M. J. Rathbun, Assistant Curators.
Helminthological Collections: C. W. Stiles,[1] Custodian.
Comparative Anatomy: Frederic A. Lucas, Curator; Frank Baker,[1] Associate Curator.

[1] Honorary, and serving without salary.

PLANTS (NATIONAL HERBARIUM): F. V. Coville,[1] Curator; J. N. Rose, C. L. Pollard, and O. F. Cook, Assistant Curators; Miss Carrie Harrison, Aid.

PALEONTOLOGY: C. D. Walcott,[1] Curator; Charles Schuchert, Assistant Curator.

Vertebrate Fossils: O. C. Marsh,[1] Curator; F. A. Lucas, Acting Assistant Curator.

Invertebrate Fossils:

Paleozoic: Charles Schuchert, Custodian.

Mesozoic: T. W. Stanton,[1] Custodian.

Cenozoic: W. H. Dall,[1] Associate Curator.

Fossil Plants: Lester F. Ward,[1] Associate Curator; F. H. Knowlton,[1] Custodian of Mesozoic Plants; David White,[1] Custodian of Paleozoic Plants.

MINERALS: F. W. Clarke,[1] Curator; Wirt Tassin, Assistant Curator.

GEOLOGY: George P. Merrill, Curator; W. H. Newhall, Aid.

LIBRARY: Cyrus Adler,[1] Librarian; Newton P. Scudder, Assistant Librarian.

ASSOCIATES.

Theodore Gill,[1] Associate in Zoology.

R. E. C. Stearns,[1] Associate in Zoology.

R. W. Shufeldt,[1] Associate in Comparative Anatomy.

C. A. White,[1] Associate in Paleontology.

C. Hart Merriam,[1] Associate in Zoology.

ADMINISTRATIVE STAFF.

CHIEF CLERK: W. V. Cox.

CHIEFS OF DIVISION:

Correspondence and Reports: R. I. Geare.

Registration and Storage: S. C. Brown.

Editor of Proceedings and Bulletins: Marcus Benjamin.

Disbursing Clerk: W. W. Karr.

Property Clerk: J. S. Goldsmith.

Photographer: T. W. Smillie.

Superintendent of Buildings: Henry Horan.

PREPARATORS.

Joseph Palmer, Chief Modeler.

William Palmer, Chief Taxidermist.

A. Z. Shindler, Colorist.

J. W. Scollick, Osteologist.

Henry Marshall, Taxidermist.

N. R. Wood, Taxidermist.

A. H. Forney, Taxidermist.

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[1] Honorary, and serving without salary.

APPENDIX II.

List of Accessions During the Fiscal Year Ending June 30, 1896.

[All accessions which are marked (*A*) consist of material obtained primarily for exhibition at the Atlanta Exposition.]

Abbott, Dr. William L. (Philadelphia, Pennsylvania): Pen drawing of a primitive still in actual use by the natives of the eastern coast of Madagascar (28960); a large and interesting collection from Madagascar, consisting of ethnological objects, mammal skins and skulls, birds' skins, birds' nests, insects from Madagascar and Kashmir, shells, alcoholic reptiles and a snake skin, specimen of eel, 5 musical instruments, and a model of a dug-out "lakana," illustrating primitive boat-building in the region where it was obtained (29967); a valuable collection of ethnological objects and natural-history specimens, comprising mammals, shells, eagles, hawks, and other birds and a snake skin, from Kashmir (30743);

Abel, J. C. (Lancaster, Pa.): Arrow and spear heads, drilled ceremonial objects, and fragments of pottery (29543); 283 stone implements, arrowheads, fragments of pottery, etc., from Harford County, Md. (29684); hammer stones, rude chipped implements, and other objects (29875); grooved hammer stones and 2 grooved axes (29965); hammer stones, grooved axes, arrowheads, and other objects from the banks of the Susquehanna River (30129).

Acheson, E. G. (See under The Carborundum Company.)

Ackley, S. M., Lieut. Commander, U. S. N. (Navy Department): Specimens of American Sole or Hogchoker, *Achirus lineatus*, and Sole or Tonguefish, *Aphoristia plagiusa* (?), from the Rio de la Plata. 30634.

Adler, Dr. Cyrus (Smithsonian Institution): Facsimile of the Leicester codex of the New Testament, the first American edition of the Hebrew Bible, and

Adler, Dr. Cyrus—Continued.

two photographs of papyrus of the Septuagint (deposit) (29796); plaster model of the Temple Tower of Babylon (gift) (29805); 2 fragments of manuscript of a Hebrew Bible, the book of Joshua Haupt's polychrome edition, Syriac New Testament, Sbadius Arabic version of the Pentateuch, Syriac Old Testament, 2 manuscript Arabic Bibles, and a manuscript Coptic Bible (29813) (*A*); piece of pottery found in the year 1891 in an ancient quarry near Jerusalem (gift) (30144); Bulgarian coin (gift) (30319); costume of a Moorish child from Tangier (gift) (30567).

Adler, Dr. Felix (New York City): Ethnological objects and 50 fragments of pottery from a cave, "Dos Caminos," near Acapulco, Mexico. Exchange. 30206.

Adams, H. Q. (Grahamville, S. C.), through Miss Eva L. Kirk: Specimens of ancient cord-marked pottery fragments, obtained from creeks. 29547.

Agassiz, Prof. Alexander. (See under Fish Commission, U. S., and Exploring Expedition, U. S.)

Agriculture, Department of, Hon. J. Sterling Morton, Secretary: Specimens of *Ctenotænia variabilis*, Stiles, 1895, from Long Island, Virginia, and Ames, Iowa (29663);[1] 7 specimens of land and fresh-water shells, representing 4 species, from the Dismal Swamp, Virginia. (29680);[1] type specimens of *Andrya americana leporis*, Stiles, 1895; *Davainea retractilis*, Stiles, 1895; *Davainea salmoni*, Stiles, 1895; *Andrya americana*, Stiles, 1895; and *Moniezia oblongiceps*, S. & H., 1893 (29936);[1] type specimen of *Baryssinus leguminicola*, Linell (30047);[1] 2 specimens of *Zopherus costa-*

[1] Deposit.

AGRICULTURE, DEPARTMENT OF—Cont'd.

ricensis, Champ, and 30 specimens of *Apanteles*, collected by Señor J. Fid Tristán, National Museum, San José, Costa Rica (30091);[1] Tarantula, *Eurypelma* sp., from San Domingo, West Indies, collected by Edgar G. Gedney, New York City (30198); miscellaneous insects, representing 38 species, collected in Kansas by F. F. Crevecœur, Onaga (30213); 25 species of Coleoptera, collected by Rev. J. L. Zabriskie, Brooklyn, N. Y. (30247); 30 specimens of Diptera, representing 4 species, collected by William Brodie, Toronto, Canada (30248); 56 specimens of Diptera, representing 7 species, also collected by Mr. Brodie (30274); land and fresh-water shells from Mexico and the western United States, obtained through Dr. C. Hart Merriam (30310); 68 species of Coleoptera, collected by Ralph Hopping, Redstone Park, Kaweah, Cal. (30320); fresh-water crabs and shrimps from Mexico, collected by Messrs. Nelson and Goldman (30327); types of *Ecyrus fasciatus*, *Amphionycha amœna*, and *Aporataxia lineata*, Hamilton, collected in Texas by C. H. Tyler Townsend (30353); 20 specimens of Aphodii, representing 7 species, collected by E. A. Schwarz at San Diego and Sharpsburg, Tex. (30357); 80 specimens of Brazilian butterflies, comprising 55 species, collected by J. G. Foetterle, Petropolis, Brazil (30397); 3 species of shells from Acapulco, Mexico (30400); 100 specimens of Diptera and Hemiptera, representing 90 species, collected by William Metcalfe, Port Hope, Ontario, Canada (30478); 20 specimens of Hymenoptera, representing 20 species; 10 specimens of Coleoptera, representing 9 species, and 8 specimens of Lepidoptera, representing 7 species, collected by J. G. Barlow, Cadet, Mo. (30502); 36 species of Hymenoptera and 30 species of Diptera, collected by William Brodie, Toronto, Ontario, Canada (30566); specimens of wild oats, *Avena fatua*, from Cornwallis, Oreg. (30583); 77 specimens of Hymenoptera and 26 specimens of Diptera, representing 8 species, collected by

AGRICULTURE, DEPARTMENT OF—Cont'd.

Prof. T. D. A. Cockerell, Las Cruces, N. Mex. (30623); insects collected at San Diego, Tex., by E. A. Schwarz, consisting of 1,500 specimens of Coleoptera, representing about 500 species; 220 specimens of Lepidoptera, representing 35 species; 120 specimens of Hymenoptera, representing 35 species, and 60 specimens of miscellaneous insects, representing 25 species (30661); 100 specimens of Cerambycidæ, representing 37 species, collected at Brownsville, Tex., by Prof. C. H. Tyler Townsend (30662); 5 specimens of parasitic Hymenoptera, representing 2 species, and 2 specimens of Diptera, representing a single species, collected by Professor Lintner, New York State College, Albany, N. Y. (30663); 300 specimens of Hemiptera, representing 175 species, collected by E. A. Schwarz at San Diego, Tex. (30693); 31 species of miscellaneous insects collected by F. F. Crevecœur, Onaga, Kans. (30694); 1,000 specimens of Coleoptera, representing 357 species, collected at Brownsville, Tex., by Prof. C. H. Tyler Townsend (30695); miscellaneous insects, collected by F. F. Crevecœur, Onaga, Kans. (30830, 30213).

DEPOSITED IN THE NATIONAL HERBARIUM: Specimen of *Xerophyllum tenax*, Nutt., collected by Vernon Bailey, Summit, Mont. (29542); 13 specimens, collected by W. C. Blasdale in California (29572); herbarium specimen from Mrs. E. J. Van Hasbrouck, Fanwood, N. J. (29599); herbarium specimen from C. A. Black, Winona, Kans. (29600); herbarium specimen of *Rhododendron viscosum* from Calvin J. Cowles, Wilkesboro, N. C. (29632); 102 herbarium specimens, collected by J. Medley Wood, Natal, Africa (29642); herbarium specimen from W. N. Suksdorf, White Salmon, Wash. (29661); 8 herbarium specimens of *Commelina nudiflora* from B. F. Bush, Campbell, Mo. (29671); 8 herbarium specimens of *Commelina virginica* from B. F. Bush (29672); specimen of *Juncus* from T. H. Kearney, of Florida (29673); 5 herbarium specimens of *Commelina hirtella*

[1] Deposit.

AGRICULTURE, DEPARTMENT OF—Cont'd. from B. F. Bush, Campbell, Mo. (29687); herbarium specimen sent by W. L. McGee, Clemson College, S. C. (29695); specimen of *Ficus elastica* from S. J. Rhoads, Metropolis, Ill. (29703); herbarium specimen from David Jackson, Dungannon, Ohio (29704); 2 herbarium specimens from S. S. Boyce, Rolling Fork, Miss. (29709); herbarium specimen from G. K. Gilbert, Pueblo, Col. (29710); 10 herbarium specimens from E. G. Weibel, Fort Huachuca, Ariz. (29724); 50 herbarium specimens collected by Mrs. A. F. Stevens, Amherst, Mass. (29730); 80 herbarium specimens from the Berlin Botanical Gardens (29739); 208 herbarium specimens from C. Copineau, Paris, France (29740); specimen of *Calochortus*, collected by A. H. Coffern, Sheridan, Wyo. (29744); 2 herbarium specimens, collected by H. C. Oberholser, on Roan Mountain, N. C. (29745); specimen of *Sedum* from Prof. N. L. Britton, Columbia College, N. Y. (29749); specimen of *Phaseolus pauciflorus*, Benth., collected by W. E. Blackburne, Anthony, Kans. (29750); herbarium specimen of *Corallorhiza* from G. H. Grinnell, Holbrook, Mass. (29826); herbarium specimen of *Sarracenia* from F. E. Boynton, Baltimore, Md. (29827); specimen of *Viola sagittata* from C. F. Wheeler, Agricultural College, Mich. (29832); 36 herbarium specimens from the University of Minnesota (29833); herbarium specimen of *Cyperus dentatus*, Torr, from L. H. Plumb, Springfield, Mass. (29834); 3 plants from W. S. Stamper, Vernon Mills, Va. (29835); specimen of *Rhamnus* from John Duncan, Louisville, Ky. (29836); herbarium specimen of *Hieracium canadense*, Michx., from G. J. Nelson, China, Me. (29837); herbarium specimen of *Prunus virginiana* from D. J. Halsted, Wales Center, N. Y. (29838); herbarium specimen of *Salix nigra wardi* from W. W. Ashe, Raleigh, N. C. (29839); specimen of *Euonymus americanus* collected by Mrs. J. S. R. Thomson in Spartanburg, S. C. (29845); 10 herbarium specimens sent by John L. Childs, Floral Park, N. Y. (29864); 3 herbarium specimens from Mrs. J. S. R. Thomson, Spartanburg, S. C. (29872); 11 herbarium specimens from H. Wurzlow, Industry, Tex., consisting of *Vernonia baldwinii* and *Gaillardia lanceolata* (29879); 12 herbarium specimens belonging to the order Liliaceae, from Mrs. A. F. Eby, Lancaster, Pa. (29880); 6 herbarium specimens from M. J. Elrod, Wesleyan University, Bloomington, Ill. (29885); herbarium specimen of *Verbena venosa*, sent by F. W. Mally, Hulen, Tex. (29886); 2 herbarium specimens from James R. Freeman, Washington, D. C. (29902); 31 herbarium specimens from Dr. N. L. Britton, Columbia College, N. Y. (29903); 30 specimens of *Pteridophytes* from C. E. Waters, Baltimore, Md. (29904); 161 herbarium specimens from A. E. Ricksecker, Oberlin, Ohio (29908); 7 herbarium specimens from T. H. Hillman, State Agricultural College, Nevada (29926); 3 specimens of cultivated plants from L. H. Dewey, Dept. of Agriculture (29956); 181 herbarium specimens from the Zurich Botanical Garden, Zurich, Switzerland (29968); herbarium specimens of *Scirpus maritima* from F. L. Scribner, Dept. of Agriculture (29969); specimen of *Lespedeza* from Dr. D. E. Salmon, Dept. of Agriculture (29977); 6 plants collected by J. N. Rose (29988); 224 herbarium specimens from Washington and Idaho, collected by C. V. Piper, Seattle, Wash. (29989); 97 Australian plants from Baron Ferd. von Müller, Melbourne, Australia (29992); 9 plants collected by F. W. Thurow, Harvester, Tex. (29993); specimen of *Quercus douglasii* collected in California by W. H. Turner (30026); 226 dried plants from B. Fink, Fayette, Iowa (30027); specimen of *Eryngium* from Miss K. A. Taylor, Baltimore, Md. (29994); specimen of *Artemisia frigida* from E. D. Stover, Albuquerque, N. Mex. (30032); 2 specimens of *Ribes* from Samuel Goodell, Blaine, Wash. (30033); 725 plants collected by C. L. Pollard in the District of Columbia and vicinity (30050); 100 herbarium specimens from Canada, sent by James M. Macoun, Ottawa, Canada (30057); 20 specimens of *Pteridophyta* from C. E. Waters, Baltimore, Md. (30069); 3 her-

AGRICULTURE, DEPARTMENT OF—Cont'd.
barium specimens from Miss Juliet Fontleroy, Va. (30077); 7 specimens collected in Maryland by F. V. Coville (30071); 7 herbarium specimens from H. Wurzlow, Industry, Tex. (30078); 20 plants from California, sent by W. L. Jepson, Berkeley, Cal. (30079); 30 plants collected in Nevada and California by C. F. Sonne, Truckee, Cal. (30080); 139 herbarium specimens from Michigan, sent by Prof. W. J. Beal, Agricultural College, Mich. (30095); 4 herbarium specimens from Florida, sent by F. H. Farrell, Homeland, Fla. (30096); 107 plants sent by W. M. Canby, Wilmington, Del. (30104); specimen of *Erigeron leibergi*, sent by Thomas C. Porter, Easton, Pa. (30105); 260 specimens collected by the Hayden Survey, and 240 plants from Pennsylvania, sent by Thomas C. Porter (30106); specimen of *Tribulus maximus* from the District of Columbia, collected by G. H. Hicks, Washington, D. C. (30121); specimen of *Anoda pentaschista*, sent by G. C. Nealley, San Diego, Tex. (30135); 660 plants, sent by Prof. J. Fowler, Kingston, Ontario, Canada (30141); 189 plants from Buckhannon, W. Va., from W. M. Pollock (30142); 2 specimens of *Ficus* from Mexico, sent by Miss Alice Eastwood, California Academy of Sciences, San Francisco, Cal. (30143); 43 plants from New York, sent by A. K. Harrison, Lebanon Springs, N. Y. (30153); 43 Australian plants from Baron Ferd. von Müller, Melbourne (30154); 620 specimens of plants from Wyoming, sent by Aven Nelson, University of Wyoming, Laramie (30171); 469 plants from W. M. Van Sickle, West New York, N. J. (30172); plant from G. H. Hicks, Washington, D. C. (30180); 2 plants from Miss Alice Eastwood, San Francisco, Cal. (30181); specimen of *Pedicularis verticillata* from Theodor Holm, Department of Agriculture (30182); 3 specimens of Colorado plants, sent by G. E. Osterhout, New Windsor, Colo. (30183); 74 plants from D. L. Topping, Washington, D. C. (30186); 6 herbarium specimens, obtained from the Kiowa Indian Reservation, Oklahoma Territory, by James Mooney, of the Bureau of American Ethnology (30187); 145 herbarium specimens from E. E. Gayle, Portland, Me. (30196); specimen of *Lygodium palmatum*, Swm., from C. E. Waters, Baltimore, Md. (30221); specimen of *Fimbristylis laxa*, collected by F. Lamson-Scribner in New Jersey (30222); 12 herbarium specimens from the western section of the United States, sent by C. S. Sheldon, State Normal School, Oswego, N. Y. (30227); 4 plants from the District of Columbia, sent by Prof. E. L. Greene, Catholic University of America (30228); 4 herbarium specimens from Colorado, sent by G. W. Osterhout, New Windsor, Colo. (30229); 102 Carices, sent by Prof. F. Lamson-Scribner, Department of Agriculture (30267); 4 herbarium specimens of Umbelliferæ from Mrs. Katharine Brandegee, San Diego, Cal. (30268); 6 Alaskan plants from Thomas Howell, Clackamas, Oreg. (30282); specimen of *Malvastrum splendens* from Dr. A. Davidson, Los Angeles, Cal. (30283); 27 miscellaneous plants from California, sent by Miss Alice Eastwood (30284); part of a type specimen of *Pithecolobium acatlense*, received through J. N. Rose (30299); specimen of *Micromeria douglasii*, sent by Gerhard Leff, San Luis Obispo, Cal. (30300); specimen of *Botrychium boreale* from G. E. Davenport, Medford, Mass. (30325); 16 specimens of Umbelliferæ, collected by Marcus E. Jones, Salt Lake City, Utah (30354); 43 Alaskan plants from Thomas Howell (30361); specimen of *Eucalyptus mortoniana*, sent by Abbot Kinney, Los Angeles, Cal. (30387); 2 plants from Pennsylvania, sent by C. N. Lochman, Bethlehem, Pa. (30388); 270 plants collected by Frank Tweedy, Washington, D. C. (30389); 17 Mexican plants from Mrs. Katharine Brandegee (30390); 6 Nebraskan plants from G. M. Bates, Long Pine, Nebr. (30391); 800 Florida plants collected by G. V. Nash, Columbia College, New York (30392); 2 specimens of *Dryopteris marginalis* from C. L. Pollard (30407); 23 herbarium specimens from Dr. N. L. Britton, Columbia College, New York (30416); 55 Canadian phanerogams, sent by the Geological Survey, Ottawa, Canada (30417);

AGRICULTURE, DEPARTMENT OF—Cont'd.
500 plants from Guatemala, sent by J. D. Smith, Baltimore, Md. (30444); 72 plants from New Mexico, collected by Dr. Washington Matthews, U. S. A. (30451); 2 specimens of *Rhus michauxii*, sent by C. D. Beadle, Biltmore, N. C. (30452); plant from Wyoming, sent by Prof. T. C. Porter, Easton, Pa. (30454); specimen of *Cotyledon* from Lower California (30461); specimen of *Schizæa bifida* from E. A. Schwarz, collected in Greymouth, New Zealand (30469); 50 mosses from J. Cardot, Stenay, Meuse, France (30470); 211 herbarium specimens from A. H. Curtiss, Jacksonville, Fla. (30475); 6 specimens of *Naiadiceæ* from Prof. William R. Dudley, Palo Alto, Cal. (30480); 266 plants from Tennessee presented to the Museum by the University of Tennessee, Knoxville (30482); 36 herbarium specimens from E. Bethel, Denver, Colo. (30507); 564 Colorado plants from C. S. Crandall, Fort Collins, Colo. (30528); 425 specimens of western plants belonging to Hayden's collection, from T. C. Porter, Easton, Pa. (30530); 7 specimens of *Banksia* from Baron Ferd. von Müller, Melbourne, Australia (30549); 23 specimens of phanerogams and cryptogams (30550); 33 plants from C. A. Davis, Alma, Mich. (30551); specimen of *Phacelia strictiflora* from T. V. Munson, Denison, Tex. (30555); 10 plants from Lower California, sent by J. E. McLellan (30560); 10 species of plants raised from seed collected by J. N. Rose from the greenhouses of the Department of Agriculture (30562); 2 herbarium specimens (*Arbutus xalapensis texana* and *Sophora secundiflora*) from G. A. Schattenberg, Boerne, Tex. (30563); plant from Florida from Mr. Benton, Department of Agriculture (30593); 8 plants from Alabama collected by Dr. Charles Mohr (30594); 69 species of Coleoptera and ants from Kansas, collected by F. F. Crevecœur, Onaga, Kans. (30595); 53 specimens collected by Vernon Bailey, Washington, D. C. (30617); herbarium specimen of *Orthocarpus purpurascens* from E. G. Still, Livermore, Cal. (30621); specimen of *Medicago minima* from J. Reverchon, Dallas, Tex. (30629); 2 herbarium specimens (*Syndesmon thalictroides* (L) Hoffmg. and *Allium vineale* (L) (30630); specimen of *Delphinium tricorne* from E. L. Knightly, McCulloughs, O. (30631); 460 plants from southern California collected by Edward Palmer (30669); 3 plants from H. J. Draut, Larned, Kans. (30672); 5 Californian plants from Dr. N. L. Britton, Columbia College, N. Y. (30681); 3 plants from Tennessee sent by S. O. Barnes, Nashville (30684); specimen of *Callitriche austini* collected by Theo. Holm, Department of Agriculture (30686); 9 plants from Minnesota collected by L. R. Moyer, Montevideo, Minn. (30712); plant from Virginia sent by G. S. Miller, jr., Front Royal, Va. (30713); plants collected in Maryland by H. W. Olds, Woodside (30734); plant sent by Mrs. R. Van Dien, Anandale, N. J. (30735); 222 Alaskan plants sent by M. W. Gorman, Portland, Oreg. (30747); 30 dried plants from Texas, sent by C. L. Marlatt, Department of Agriculture (30748); 48 specimens of Florida algæ sent by A. H. Curtiss, Jacksonville (30759); 118 lichens sent by Bruce Fink, Fayette, Iowa (30760); 30 plants from Sonora collected by W J McGee, Washington, D. C. (30761); 225 plants from New York sent by W. W. Rowles, Ithaca, N. Y. (30773); 751 plants from Kansas sent by C. H. Thompson, St. Louis, Mo. (30778); 75 plants from Massachusetts, sent by Wellesley College (30787); 16 specimens of *Junci* from S. M. Tracy, Agricultural College, Miss. (30789); 116 African plants sent by J. M. Wood, Durban, Natal, Africa (30794); plant from New York sent by Mrs. Mary W. Coy, Mount Morris, N. Y. (30797); 9 specimens of Umbelliferæ from Idaho, sent by A. A. Heller Lancaster, Pa. (30804); specimen of *Trillium cernuum* from Amos L. Griffith, Pell City, Ala. (30818); specimen of *Apogon humilis* from C. N. Gould, Winfield, Kans. (30819); specimen of *Jatropha berlandieri* from R. H. Brown, Campbelltown, Tex. (30820); specimen of *Asclepias verticillata*, L., from J. M. Brown, Eden, Ala. (30821); 3 specimens of plants be-

AGRICULTURE, DEPARTMENT OF—Cont'd. longing to the family Juncaceæ, collected by Prof. Marshall A. Howe, University of California, Berkeley, Cal. (30822); specimen of *Cymopterus corrugatus* from J. B. Leiberg, Hope, Idaho (30823); 681 plants from J. B. Leiberg (30828).

ALDRICH, T. H., Hon. (Washington, D. C.): Species of *Amphidromus* from the Philippine Islands. 30569.

ALEXANDER, A. B. (See under Fish Commission, U. S.)

ALLEN, FRANK (Woodside, Md.): Specimen of *Scalops aquaticus*. 30788.

ALLEN, Dr. H. N. (See under W. W. Rockhill.)

ALLEN, PARDON (Auburn, Me.): Antique candle-stick, snuffers, and lamp. Exchange. 20738.

ANTHONY, A. W. (San Diego, Cal.): Collection of mammals from California, consisting of 71 skins and skulls and 20 alcoholic specimens (purchase) (29675); 12 birds' skins, principally from California (deposit) (one skin returned) (29909); 4 Petrels, consisting of 2 specimens of *Puffinus tenuirostris* and two of *Fulmarus columba* (gift) (30256); bird skin from Colorado (deposit) (30436); 3 birds' skins from California (deposit) (30554); skeleton of Petrel (*Fulmarus rodgeri*), and 3 type specimens of birds (gift) (30676); 2 dried specimens of *Oceanodroma socorroensis* (gift) (30805); skeleton of *Puffinus griseus* (gift) (30817).

APPLETON, J. W. M. (Salt Sulphur Springs, W. Va.): Specimen of impure graphite. 30644.

ARKANSAS COMMISSION TO COTTON STATES AND INTERNATIONAL EXPOSITION (transmitted by L. Vincenheller, Commissioner, Little Rock, Ark.): twenty specimens of minerals. (*A.*) 30294.

ARNOLD, DELOS (Pasadena, Cal.): Specimen of *Scala lineata*, Say, from the southeastern coast of the United States. 29807.

ARNOLD, E. (Battle Creek, Mich.): Five eggs (1 set) of Western Grebe, 10 eggs (1 set) of American Goldeneye Duck, 6 eggs (1 set) of Canvasback Duck, and 4 eggs (1 set) of Redhead Duck from North Dakota. Exchange. 30215.

ARUP BROTHERS (exhibit at the Cotton States and International Exposition, Atlanta, Ga.): Six pieces of Royal Copenhagen porcelain, 2 pieces of Ipsen's faïence and 3 specimens of iridescent glass. (*A.*) Purchase. 30324.

ASHE, W. W. (See under Department of Agriculture.)

ASHMEAD, W. H. (Department of Agriculture): Specimens of *Aphodii*, consisting of *Aphodius ægrotus*, Horn., and *Atænius lecontei*, Harold, from Florida (new to the Museum collection). 30366.

ATTWATER, H. P. (San Antonio, Tex.): Seventeen birds' eggs, representing 4 species, also 2 nests (gift) (30090); 3 specimens of Woodpecker, *Melanerpes formicivorus aculeatus* from Texas (gift) (30162); 300 birds' skins from Texas (purchase) (30639); 2 skins of *Aphelocoma cyanotis*, and 4 skins of *Dendroica chrysoparia*, 20 eggs of *Aphelocoma cyanotis*, and 8 eggs of *Dendroica chrysoparia* (purchase) (30697).

AUDENREID, Mrs. M. C. (Washington, D. C.): Japanese armor. Deposit. 30001.

AUTOCOPYIST COMPANY (London, England): Photo-autocopyist outfit and specimens of work. Purchase. 30638.

AVERY, W. C. (Corinth, Vt.): Insects. 29921.

AZEEZ, Miss A. A. (Brooklyn, N. Y.): Four ancient Egyptian vessels of stalagmite marble, 6 ancient terra-cotta lamps, an oil vessel, and a Persian pierced lamp (30209); Egyptian amulets and carvings, Tyrian terra-cotta head and holy oil jug, and a brass holy-water vessel (the Holy Grail of the Imam) (30210). Purchase.

BABBITT, J. O. (Dighton, Mass.): Thirty-five arrowheads. 29723.

BABBITT BROTHERS (Flagstaff, Ariz.): Volcanic sublimation products from near Flagstaff. 30408.

BACHMAN, GEORGE W. (Freemansburg, Pa.): Arrowhead from Wasnington County, Pa. 30110.

BAILEY, VERNON. (See under Department of Agriculture.)

BAKER, FRANK C. (See under Chicago Academy of Sciences.)

BAKER, Dr. FRANK. (See under Smithsonian Institution, National Zoological Park).

BALDASANO, SEÑOR ARTURO. (See under Soria y Mata, Señor Arturo.)

BALL, E. P. (Palmer, Mass.): Photograph representing three views of a bird-shaped object. 29983.

BANGS, OUTRAM (Boston, Mass.): Five eggs and two nests of Olive-sided Flycatcher, *Contopus borealis*, from Mass. (29942); specimen of *Menippe mercenaria* from St. Marys, Ga. (30584).

BARBER, Dr. E. A. (West Chester, Pa.): Mouth portion of a tubular pipe from the southwestern section of Colorado. 30240.

BARDROFF, JOSEPH & SON (Washington, D. C.): Imported English Blue Pouter Pigeon. 30611.

BARLOW, CHESTER (Santa Clara, Cal.): Two eggs of California Pigmy Owl, *Glaucidium gnomo californica*. 29915.

BARLOW, J. G. (See under Department of Agriculture.)

BARNES, S. O. (See under Agriculture, Department of.)

BARNES, Dr. WILLIAM (Decatur, Ill.): Seventy-five specimens of North American Lepidoptera (new to, or poorly represented in the Museum collection) (30004); 60 specimens, representing 35 species of North American Lepidoptera (30111). Exchange.

BARNUM & BAILEY (Bridgeport, Conn.): Specimen of *Ovis tragelaphus*. 30657.

BARTLEMAN, R. M. (United States consul, Antigua, West Indies): Four photographs of caribs and rock etchings. 30729.

BARTSCH, PAUL (U. S. N. M.): Nest and 2 eggs of Ruby-throated Humming bird, *Trochilus colubris*, from Four Mile Run, Va. 30793.

BATES, G. M. (See under Department of Agriculture.)

BAULCH, WILLIAM (Fort Monroe, Va.): An abnormal orange. 29667.

BEADLE, C. D. (See under Department of Agriculture.)

BEAL, Prof. W. J. (See under Department of Agriculture.)

BEALE, C. F. T. (Georgetown, D. C.): Autograph of James Rumsey, constituting a receipt to a bill for making two bellows, £5 10s., rendered against the "Potomack Company" February 11, 1786, bill approved by George Washington with his autograph signature. 29636.

BEALE, C. F. T.—Continued.

BEAN, Dr. T. H. (New York Aquarium, Battery Park, N. Y.): Two specimens of *Nereis limbata*, Ehlers, from near Absecon Beach, N. J., obtained by Alfred Hand, Philadelphia. 29997.

BECK, R. H. (Berryessa, Cal.): Two birds' skins, representing 5 species, from Santa Cruz Island and Sonoma County, Cal. 29603.

BELLUCCI, Prof. GUISEPPE (Perugia, Italy), through Thomas Wilson: A collection of archæological objects, consisting of cores, flakes, scrapers, and arrowheads of flint, polished hatchets, glass beads and discs, and clay spindle-whorls. Deposit. 30806.

BENDIRE, Maj. CHARLES, U. S. A.: Infusorial earth from White Head Lake, Herkimer County, N. Y. (29747); 4 eggs of Mountain Chickadee, *Parus gambeli*, from Arizona, and 5 eggs of Pine Grosbeak, *Pinicola enucleator*, from Maine (29941). (See under D. B. Burrows, W. B. Judson, and Dr. W. L. Ralph.)

BENJAMIN, WILLIAM EVARTS (New York City): Hebrew ceremonial manuscript, first and second edition of American-Greek Testament. (*A.*) Purchase. 29660.

BENTON, Mr. (See under Department of Agriculture.)

BERGER, G. G., (Santos, Brazil, transmitted by H. C. Smith, United States consul): Skin of a Brazilian Sloth, *Bradypus*. 29842.

BERGMANN, C. F. W. (Washington, D. C.): Specimen of Regal Walnut-moth, *Citheronia regalis*. 29639.

BERLIN BOTANICAL GARDENS. (See under Department of Agriculture.)

BETHEL, E. (See under Department of Agriculture.)

BETTESWORTH, G. W. (Omaha, Nebr.): Specimens of soil, sand, rock, bones, ashes, shells, pottery, flints, etc., from ash layers in ancient burying grounds at Smiths Canyon and Bellevue, Nebr. 30242.

BICKNELL, J. Y. (Buffalo, N. Y.): Pair of Black Minorca Fowls. 30752.

BILLINGS, W. R. (Ottawa, Canada): One hundred and thirteen specimens of Trenton brachiopods from the vicinity of Ottawa. Exchange. 30645.

BINKLEY, S. H. (Alexandersville, Ohio): Arrowhead with an accretion of limestone. 29727.

BISHOP, H. R. (New York): Specimen of Silesian jade. 30037.

BLACK, C. A. (See under Department of Agriculture.)

BLACKBURN, Dr. J. W. (Washington, D. C.): Snake from the grounds of St. Elizabeth's asylum. 30315.

BLACKBURNE, W. E. (See under Department of Agriculture.)

BLACKFORD, J. W. (Berkeley Springs, W. Va.): Bullet found in St. Johns Run, near Berkeley Springs, supposed to have been one of the bullets fired by the British troops under General Braddock. 29781.

BLACKMAR, Gen. W. W. (Boston, Mass.): Two photographs of the "Grant chair." 30668.

BLAIR, R. A. (Sedalia, Mo.): Twenty-seven specimens of Lower Carboniferous (Chotcau) fossils (29697); 18 specimens of Lower Carboniferous (Choteau) fossils (29765).

BLAISDEL, Dr. F. E. (Mohel Hill, Cal.): Type specimen of *Helops stenotrichoides*, Blaisdel. 30430.

BLAKE, W. P. (director Arizona School of Mines, Tucson, Ariz.): Two specimens of volcanic tufa. 30382.

BLANCHARD, G. (Junction, Ohio): Arrow and spearheads, grooved axes, and other objects from Paulding County. 30273.

BLANCHARD, Prof. RAPHAEL, (Paris, France): Alcoholic parasitic worms. Exchange. 29624.

BLASDALE, W. C. (See under Agriculture, Department of.)

BLODGETT, FREDERICK (New Brunswick, N. J.): Specimens of *Lygodium palmatum*. 30113.

BLUNCK, A. E. (Johnstown, N. Y.): Prize Red Pyle Game fowl. 30722.

BOAS, Dr. FRANZ (New York): Series of cedar-bark ornaments and masks from Fort Rupert, British Columbia. Purchase. 30192.

BOEPPLE, J. F. (Muscatine, Iowa): Curiously formed pearl taken from a Unio. 30714.

BOFILL, Señor ARTURO (Museo Martorell, Barcelona, Spain): Three specimens of Cretaceous gastropods. 30367.

BOND, G. J. (Washington, D. C.): Arrow obtained from the Sioux Indians. 30340.

BONNET, ANDRÉ (Paris, France): Collection of Tertiary fossil shells from the Paris Basin. Exchange. 29607.

BOOTH, JOHN (Coalville, Utah): Minerals. 30149.

BOUCARD, A. (Oak Hill, Spring Vale, near Ryde, Isle of Wight, England): One thousand three hundred and forty-six birds from various parts of the world (29707); 1,580 birds' skins from different regions, containing many species and several genera new to the Museum collection (30421).

BOWERS, M. A. (Little Rock, Ark.): Galls of *Pemphigus populicaulis*. 30068.

BOWLES, C. W. (Ponkapog, Mass.): Nest and 4 eggs of Swamp Sparrow, *Melospiza georgiana*, from York County, Me. (29734); nest and 5 eggs of Swamp Sparrow (30720).

BOYCE, S. S. (See under Department of Agriculture.)

BOYNTON, F. E. (See under Department of Agriculture.)

BOYNTON, Mrs. H. V. (Washington, D. C.): Nest of California Bushtit from Pasadena. 30537.

BRADLEY, EDGAR J. (Happy Valley Waterworks, South Australia): Three crabs, a hermit crab, and two crayfishes (29831); shells, crabs, specimen of *Myrmecia forficata*, Fab., and two Geckos (29895); 11 specimens of *Chasmagnathus haswellianus*, Whitelegge (30107); starfish, crabs, and specimens of *Branchiopus* (30575). Exchange.

BRAIDA, S. C. (Washington, D. C.): Pair of iron stirrups from San José, Costa Rica, supposed to have belonged to the Cortez period. 30128.

BRALEY, Miss ETTA, (Washington, D. C.): Specimen of *Lachnosterna diffinis*, Blanch, from Arkansas. 30603.

BRANDAGEE, Mrs. KATHARINE. (See under Agriculture, Department of.)

BRANDES, Dr. GUSTAV (Zoologisches Institut, Halle, a/s, Germany): Specimens of *Ctenotœnia leuckarti* (=co-type of *Dipylidium leuckarti; Ctenotœnia goezei* (=co-type of *Dipylidium latissimum;* and *Ctenotœnia pectinata* (=*Dipylidium pectinatum*, Riehm. Exchange. 29946.

BRAY, P. H. (Washington, D. C.): Twelve birds from Madagascar. Purchase. 29645.

BREED, ESTATE of Dr. DANIEL (Washington, D. C.), transmitted by Prof. B. T. Janney, administrator: Species of coral, 7 species of mollusks, 100 species of Paleozoic fossils, 36 species of Mesozoic fossils. 30076.

BRETHERTON, B. J. (Newport, Oreg.): Two specimens of Townsend's Sparrow, *Passerella iliaca unalaschensis*, from Kadiak Island, Alaska (exchange) (29641); 2 skins of *Microtus montanus?* (gift) (30217); 7 species of Lepidoptera (gift) (30468).

BRETT, WALTER (Lakeport, Cal.): Specimen of *Balbiania falcatula*, Stiles, 1893. 29933.

BREWER, Dr. M. M. (See under Dr. D. S. Lamb.)

BREWSTER, WILLIAM (Cambridge, Mass.): One hundred and forty-one birds' skins, representing 51 species, from various portions of Mexico and the United States. 30252.

BRIAN, Capt. H. T. (Washington, D. C.): Specimen of *Atalapha noveboracensis*. 29552.

BRICE, Capt. J. J., U. S. N. (See under Fish Commission, U. S.)

BRITISH WEST INDIA COMMITTEE (transmitted by Dr. David Sharp, Cambridge, England): One hundred and sixty-five specimens of insects, representing 83 species of parasitic Hymenoptera, from Grenada, West Indies. 29922.

BRITTON, Dr. N. L. (See under Agriculture, Department of.)

BROCKETT, PAUL, U. S. N. M.: Two skins with skulls of Brown Bat, *Adelonycterus fuscus*. 29773.

BBODIE, WILLIAM. (See under Agriculture, Department of.)

BRODNAX, Dr. B. H. (Brodnax, La.): Specimens of Bee (*Colletes thoracica*)

BRODNAX, Dr. B. H.—Continued. (30557); 2 eggs of Turkey Buzzard, *Cathartes aura* (30718).

BROKAW, L. W. (Carmel, Ind.): Twelve eggs of Snowy Plover, *Ægialites nivosa;* 11 eggs of Least Tern, *Sterna anbillarum*, and 9 eggs of Pigmy Nuthatch, *Sitta pygmea*, from California. Exchange. 29768.

BROOKS, W. E. (Mount Forest, Ontario, Canada): Three skins of *Hippolais caligata*, and 3 skins of *Acrocephalus agricola*. 30458.

BROOKS, Dr. W. K., Johns Hopkins University (Baltimore, Md.), transmitted by Charles P. Sigerfoos: Skin of Sea Lion, *Zalophus californicus*, from Druid Hill Park. 30102.

BROWN, C. F. (Hot Springs, Ark.): Five specimens of quartz (crystals distorted and modified). 30296.

BROWN, EDWARD J. (Washington, D. C.): Paroquet (*Palœornis torquata*), in the flesh (29637); egg of Audubon's Shearwater, *Puffinus auduboni*, from Ragged Island, Bahamas (30779).

BROWN, Mrs. J. CROSBY (Orange, N. J.): Virginal from Italy (purchase) (29593); musical instruments from Borneo (exchange) (29793); 7 musical instruments from France, China, New Caledonia, England, Spain, and New Guinea (exchange) (30167); Melodeon (30431).

BROWN, JAMES M. (See under Agriculture, Department of.)

BROWN, Mrs. N. M. (Ashtabula, Ohio): Eight hundred and six plants, collected by E. W. Nelson in New Mexico. Purchase. 30122.

BROWN, R. H. (See under Agriculture, Department of.)

BROWN, Capt. W. C., U. S. A.: Apache carrying basket, and a basket in process of construction, with tools and materials used. 30140.

BROWN, WILLIAM DU VAL (Washington, D. C.): Sword, belt, and buckle presented to Maj. Gen. Jacob Brown by the State of New York; gold snuffbox presented by the city of New York, and a gold medal presented by Congress for services at the Battle of Chippewa, Niagara, and Erie, in 1814. Deposit. 30137.

BROWN, WILLIAM FINDLAY. (See under City Council of Philadelphia.)

Brownell, Bequest of Lieut. Frank E. Transmitted by Washington Loan and Trust Company, executor of estate: Revolver, cap ornament, and scarf pin owned by the late Col. E. E. Ellsworth; gold medal presented to Lieutenant Brownell by the citizens of Troy; medal of honor presented by Congress; medal containing a piece of the Marshall House flag; badge of the Society of the Army of the Potomac; dagger presented by the citizens of Boston; rope watch-chain made from a Marshall House flag-halyard, and a revolver presented by the New York Board of Brokers. 30411.

Bruce, M. W. (Washington, D. C.): Photograph of Eskimo children from Port Clarence, Alaska. 30513.

Brunetti, E. (London, England): Ninety-six specimens of British Diptera. Exchange. 29558.

Brunner, F. J., (Washington, D. C.): Coleoptera from Kansas. 30308.

Bryant, H. G. (Philadelphia, Pa.): Model of a stone lamp and cooking pot from North Greenland. 30514.

Buerbaum, T. (Salisbury, N. C.): Casts of two gold nuggets. 30548.

Burden, C. E. (Washington, D. C.): Specimen of *Cymindis neglecta*, Hald. 29887.

Burger, Peter (U. S. N. M.): Specimen of *Atalapha noveboracensis*, in the flesh. 29748.

Burnett, Dr. S. M. (Cosmos Club, Washington, D. C.): Miniature Bible. (*A.*) Deposit. 29798.

Burns, Frank (U. S. Geological Survey): Shells from Northern Texas. 29817.

Burns, W. R. (Concord, Ky.): Archæological objects from Kentucky. (29649, 30671.)

Burrows, D. B. (Lacon, Ill.), through Major Bendire: Four specimens of Cassin's Sparrow, *Peucæa cassini*, from Texas. 29743.

Burtch, Verdi (Penn Yan, N. Y.): Unionidæ from New York. (30462, 30520.)

Busching, Henry (U. S. N. M.): Specimen of *Telea polyphemus*. 29721.

Bush, B. F. (See under Agriculture, Department of.)

Bush, S. S. (Louisville, Ky.): Cast of terra-cotta image. 30352.

Cæsar, Col. G. (Franklin Furnace, N. J.): Specimen of fowlerite in calcite, and a specimen of caswellite with willemite. (30558, 30598.)

Calcutta Botanical Garden (Calcutta, India): 511 herbarium specimens. Exchange. 29883.

Call, R. Ellsworth (Cincinnati, Ohio): Eighty-three bats, 250 alcoholic bats, Diptera and larvæ from Mammoth Cave, Ky. (30251, 30396, 30531, 30642.)

Call, Dr. S. J. (Ungar Island, Alaska): Eggs of Golden-crowned Sparrow, *Zonotrichia coronata*, Dwarf Hermit Thrush, *Turdus unalaschkæ*, Sandwich Sparrow, *Ammodramus sandwichensis* (29762); collections of birds' eggs from Shumagin and Atka islands, Alaska, representing one new species, and several species but poorly represented in the Museum collection. (30063.)

Campbell, J. Macnaught (Kelvingrove Museum, Glasgow, Scotland): Forty disks and parts of 2 rings of cannel coal from the old section of Portpatrick church-yard, Wigtonshire. Exchange. 29881.

Campbell, Mrs. J. E. (Pasadena, Cal.): Shells from California. (30008, 30370, 30495.)

Campbell, W. P. (Bethany, W. Va.): Maori robe made of New Zealand flax. (*A.*) Purchase. 29561.

Canby, W. N. (See under Agriculture, Department of.)

Cardot, J. (See under Agriculture, Department of.)

Carl, Wohlgemuth (Bozen, South Tyrol, Austria): Beer mug, 2 copper wine pots, quillwork belt and a fur cap from the Tyrol. Exchange. 30402.

Carroll, B. F. (Blooming Grove, Tex.): Thigh bone of a mammoth. 30609.

Carter, James C. (New York City): Specimen of Gadwall, *Anas strepera*, from Currituck Sound. 30195.

Carter, John F. (Sistersville, W. Va.): Oil sand from Tyler County. 29647.

Cartwright, O. E. (Detroit, Mich.): Piece of bedticking filled with feather down. 30616.

Case, H. B. (Loudonville, Ohio): Fossils. Exchange. 30385.

CASTOR, T. H., & Co. (Boston, Mass.): "The Process Year Book," London, 1896. 30798.

CAWOOD, W. H. H. (Weedonsville, Va.): Wrought-iron frame, made to fit the body of a man, in which was found a human skull. Deposit. (Returned.) 29598.

CHAMBERLAIN, Dr. L. T. (The Chelsea, New York City): Thirty specimens of fresh-water shells, Unios, and other material from New Zealand (gift) (29962); collection of southern gems, gem minerals, and other specimens (presented to the Smithsonian Institution, and deposited in the National Museum with the Isaac Lea collection) (30317); specimen of green tourmaline, weighing 57⅛ carats, from Mount Mica, Me. (presented to the Smithsonian Institution and deposited in the National Museum with the Isaac Lea collection) (30362); 22 species of shells principally from Borneo (presented to the Smithsonian Institution and deposited in the National Museum) (30374); 14 species of Unios from Arkansas and Texas (presented to the Smithsonian Institution and deposited in the National Museum) (30427); 1,716 shells, representing 209 species from various localities in Texas (presented to the Smithsonian Institution and deposited in the National Museum) (30648); nugget of native silver, weighing 448 ounces, from near Globe, Pinal County, Ariz. (gift) (30664).

CHAPMAN, N. A. (Twinsburg, Ohio): Plaster casts of stone implements and other archæological objects. Presented to the Smithsonian Institution and deposited in the National Museum. 30675.

CHAPMAN, R. H. (See under Interior Department, U. S. G. S.)

CHASTER, GEORGE W. (Southport, England): Specimens of *Odostomia lactea*, Jeff., from the coast of Teignmouth (exchange) (29615); 10 species of small Mediterranean shells (gift) (30214).

CHATARD, Dr. T. M. (U. S. Geological Survey): Specimen of margarite on emery from Chester, Mass. 30679.

CHICAGO ACADEMY OF SCIENCES, (Chicago, Ill.), transmitted by Frank C. Baker: Unionidæ from Illinois and Indiana. (30132, 30433, 30829.)

CHILDS, J. L. (See under Agriculture, Department of.)

CHITTENDEN, F. H. (See under Agriculture, Department of.)

CHITTENDEN, NEWTON H. (Mill River, Mass.): Archæological objects from Massachusetts, Arizona, British Columbia, and Mexico. 30486.

CHRISTY, THOMAS & Co. (London, England): Bitter Kola nuts. 30457.

CINCINNATI SOCIETY OF NATURAL HISTORY (Cincinnati, Ohio): Casts of horn cores of a fossil bison. 30753.

CLAPP, G. H. (Pittsburg, Pa.): Land and fresh-water shells, and 4 specimens of cretaceous oysters from Canada and Texas. (29652, 29843, 29851.)

CLARK, Miss EDITH M. (Burlington, Vt.): Salamander. 29726.

CLARKE, Lieut. F. L., U. S. A. (See under Smithsonian Institution, Bureau of Ethnology.)

CLARKE, Prof. F. W. (U. S. Geological Survey): Specimen of pectolite. 30678. (See under Interior Department, U. S. Geological Survey.)

CLARKE, R. L. B. (Washington, D. C.): Luna Moth, *Actias luna*. 29620.

CLÉRET, J. (Philadelphia, Pa.): Indo-Pacific pearl oyster. 30426.

CLEVELAND, Miss SALLIE (Clear Spring, Tenn.): Fossils from the Ordovician rocks of eastern Tennessee. 30270.

COBLEIGH, W. S. (Los Angeles, Cal.): Nest of Prothonotary Warbler, *Protonotaria citrea*, from Illinois. 29822.

COBOLINI, LOUIS (Rockport, Tex.): Two specimens of Thread-fin (*Polynemus*), from the Gulf of Mexico. 30701.

COCKERELL, Prof. T. D. A. (Las Cruces, N. Mex.): Specimen of *Strongylus contortus* (29928); 12 specimens of Diptera (30003); 7 specimens of *Porcellio* (30081). (See under Agriculture, Department of.)

COFFERN, A. H. (See under Agriculture, Department of.)

COLEMAN, A. P. (Toronto, Canada): Fourteen species of recent and fresh-water shells from Niagara Falls and vicinity. 29947.

COLLINGE, W. E. (Mason College, Birmingham, England): Six species of British algæ. 30506.

COMBS, K. B. (Washington, D. C.): Specimen of *Sciurus carolinensis*. 29972.

CONANT, F. S. (Johns Hopkins University, Baltimore, Md.): Three species of chætognaths. 30534.

COOKE, Miss J. M. (San Diego, Cal.): Shells from San Diego and Lower California. 30740.

COPINEAU, C. (See under Agriculture, Department of.)

COPP, JOHN BRENTON (New Haven, Conn.): Collection of household goods, wearing apparel, pottery, glass, pewter, jewelry, and other objects.[1] 30249.

COPPEE, H. ST. L. (See under Andrew Tracy.)

COPPER QUEEN CONSOLIDATED MINING COMPANY (New York City), transmitted by James Douglas: Minerals from Copper Queen Mine, Bisbee, Ariz. 30576.

COQUILLETT, D. W. (Department of Agriculture): Types of 28 new species of Empidæ. 29640. (See under A. Davidson.)

COSTA RICA, NATIONAL MUSEUM OF (San José, Costa Rica), transmitted by Señor J. Fid Tristán: Crabs. (30099, 30777.)

COUPER, W. P. (Department of the Interior, Washington, D. C.): Specimen of massive pyrite from near Hot Springs, Ark. 30118.

COVERT, A. B. (Ann Arbor, Mich.): Skin of Rio Grande Yellow-throat and skin of Bronzed Grackle, *Callothrus robustus*, with malformed bill. 30365.

COVILLE, F. V. (U. S. Department of Agriculture): Two herbarium specimens of *Peucedanum graveolens* (L.). 29937. (See under Agriculture, Department of.)

COWLES, C. J. (See under Agriculture, Department of.)

COX, EMERY (Brightwood, D. C.): Specimen of *Scalops aquaticus* (30158); Indigo Bunting, *Passerina cyanea* (30786).

COX, PHILIP (St. John, New Brunswick): Three frogs. 30254.

COX, W. V. (chief clerk, U.S.N.M.): Snake. 30304.

COY, Mrs. MARY WINEGER. (See under Agriculture, Department of.)

CRANCH, Mrs. C. D. (Urbana, Ohio): Collection of engravings (29855); prints of antique vases and urns (30518).

CRANDALL, C. S. (See under Agriculture, Department of.)

CRAWFORD, J. J. (San Francisco, Cal.): Limestone underlying oil strata at Santa Paula, Cal. 29557.

CREDNER, Dr. HERMAN (Leipsic, Germany): 14 specimens of *Branchiosaurus amblystomus* from the Middle Permian Group of Germany. 30536.

CRENSHAW, Mrs. W. H. (Sumterville, Fla.): Pieces of punk used by the Indians for lighting fires. 30769.

CREVECŒUR, F. F. (Onaga, Kans.): Insects; land and fresh-water shells (30287, 30369, 30438, 30463, 30523, 30757, 30811). (See under Agriculture, Department of.)

CROCKER, Rev. HENRY (Fairfax, Vt.): Four plaster casts of trilobites. 29764.

CROSBY, F. W. (Washington, D. C.): Geological specimens (29719); green antique porphyry from Greece (30010). Purchase.

CROSBY, F. W. and W. O. (Boston, Mass.): Geological material from England, Italy, Canada, and the United States. Exchange. 30556.

CROSS, F. J. (Keystone, S. Dak.): Pellets of marcasite, from Foster Gulch, S. Dak. 30159.

CROWFOOT, JESSIE (San Miguel, Cal.): Worm-shells (gift), and fossil skull and toe-bone of a fossil horse (exchange). 29537.

CULIN, STEWART (University of Pennsylvania, Philadelphia, Pa.): Three musical toys. 29698. (See under Pennsylvania, University of.)

CURRIE, Rev. HECTOR (Thedford, Ontario, Canada): Ten specimens of Hamilton group fossils. Exchange. 30014.

CURTIS, W. T. S. (Washington, D. C.): Herbarium specimen of *Pæonia albiflora*, Pall. 29564.

CURTISS, A. H. (See under Agriculture, Department of.)

[1] Presented to the Smithsonian Institution and deposited in the National Museum. Accessions 28273 and 27084 received from Mr. Copp in previous years have been referred to in the Accession Lists in previous reports.

DAGGETT, ALBERT (Washington, D. C.): Maltese Angora cat, in the flesh. 30373.

DALL, W. H. (U. S. Geological Survey): Human arm-bone from a prehistoric Eskimo grave, and a chipped implement of slate from a prehistoric village site on Table Island, Alaska (29964); grip of a harpoon from the same locality (30046).

DAMON, ROBERT F. (Weymouth, England): Plaster cast of *Bothriolepis canadensis* and one of *Cephalaspis lyelli* (purchase) (30085); geological material, 2 specimens of minerals, 12 Indian implements, and 2 antique lanterns (exchange) (30208).

DANIEL, J. H., Jr. (Lynchburg, Va.): Eggs of Whippoorwill, *Antrostomus vociferus;* Crested Fly-catcher, *Myiarchus crinitus* (29733); Prairie Warbler, *Dendroica discolor,* and Yellow-breasted Chat, *Icteria virens* (30698).

DANIEL, Dr. Z. T. (Pine Ridge Agency, S. Dak.): Salamander (39544); arrowhead and a worked flake of flint (29669); iron arrowhead made by the Sioux Indians (29683); fossil shell of a land snail (29731); Owl Moths, *Catocala luciana,* H. Edwards (29763, 29783); sling used by a Sioux Indian boy (30114).

DANNEFAERD, S. (Auckland, New Zealand): Nine birds' skins from New Zealand and adjacent islands. Purchase. 20830.

DANNHAUSER, MAX (Brooklyn, N. Y.): German bearded pigeon. 30377.

DAVENPORT, G. E. (See under Agriculture, Department of.)

DAVIDSON, A. (Los Angeles, Cal.), transmitted by D. W. Coquillett: Specimen of *Xysticus limbatus,* Keys. 30602. (See under Agriculture, Department of.)

DAVIS, CHARLES E. (Parker, Ariz.): Model of Tule raft made by Hooker-ow, chief of the Mojave Indians. 30405.

DAVIS, C. A. (See under Agriculture, Department of.)

DAWSON, SIR WILLIAM (McGill College, Montreal, Canada): Two gutta-percha casts of *Palæaster parviusculus* and *Palæaster granti.* 30450.

DAY, CHARLES (Takoma Park, D. C.): Specimen of *Accipiter atricapillus.* 30175.

DAY, Dr. DAVID T. (U. S. Geological Survey): Crude and refined ozocerite from Soldiers Summit, Utah (30234); specimen of zaratite on chromite (30234); metallic manganese (30460); specimen of wavellite from Mount Holly Springs, Pa. (30640.) (See under The Carborundum Company.)

DEANE, WALTER. (See under J. N. Rose.)

DEEBLE, Dr. HORACE M. (Georgetown, D. C.): Scalp lock and leggings of Sitting Bull. 30802.

DENNISON, G. H. (San Juan Island, Wash.): Birds' eggs from Puget Sound, Washington, comprising Rusty Song Sparrow, *Melospiza fasciata guttata,* and Townsend's Sparrow, *Melospiza iliaca unalaschensis.* 30065.

DE TURK, M. L. (Oley, Pa.): Arrow and spear heads, stone pipe and fragments of pottery. Exchange. 30264.

DEVINS, G. W. (See under Jacob Sedore.)

DEWEY, L. H. (See under Agriculture, Department of.)

DEXTER, NEWTON (Providence, R. I.): Abnormal specimen of Stilt, *Himentopus mexicanus.* 30665.

DIEUDONNÉ, JULES A. (Bladensburg, Md.): Cocoon of a Cecropia Silk Moth. 29736.

DIEFFENBACH, J. G. (Northumberland, Pa.): Arrowheads and a caltrop from the vicinity of Fort Augusta, Northumberland. Exchange. 30488.

DODGE, BYRON E. (Richfield, Mich.): Ornament of banded slate, and a ring-shaped natural formation. Deposit. 30169.

DORSEY, G. A. (Peabody Museum, Cambridge, Mass.): Three photographs of ancient and modern Peruvian looms, basketry, and burial deposits. 29943.

DORSEY, Dr. H. W. (Hyattsville, Md.): Brown Leghorn hen. 30255.

DOUBLEDAY, Mrs. ABNER (Washington, D. C.): Garrison flag of Fort Moultrie. Lent by Mrs. Doubleday to the Smithsonian Institution, and at her death to be presented to the Institution. Deposited in the National Museum. 30406.

DOUGLAS, JAMES. (See under Copper Queen Consolidated Mining Company.)

DRAKE, Mrs. MARIA (Tacoma, Wash.): Marine shells from Puget Sound and other localities. 29545.

DRAUT, H. J. (See under Agriculture, Department of.)

DROWNE, F. H. (Providence, R. I.): Insects, crustaceans, and worms. 30647.

DRURY, Dr. G. A. (Washington, D. C.): Gray Squirrel (Albino), *Sciurus carolinensis*. 29860.

DU BOSE, Mrs. J. W. (Huguenot, Ga.): Slate dial plate. Deposit. 29643.

DUDLEY, Prof. W. R. (See under Agriculture, Department of.)

DUERDEN, J. E. (See under Jamaica, Institute of.)

DUGÈS, Dr. A. (Guanajuato, Mexico): Shells, starfish, and three Gorgonians, specimen of *Chlorophonia occipitalis*, and a specimen of *Merula migratoria propinqua* (29568); miscellaneous insects (29685); plants and bulbs (29706); bronze medal of Charles Lucien Jules Lawrence Bonaparte, and marine and fresh-water shells (29751); insects (29801); collection of insects from Texcoco Lake and specimen of *Vireo bellii* (30501); 8 specimens of *Pseudothpelphusa jouyi* (30542).

DUMBELL, Mrs. PRENTICE (Hamlet, Ill.): Paper Nautilus containing animal. Purchase. 30218.

DUNCAN, JOHN. (See under Agriculture, Department of.)

DUNCAN, W. J. (Barnwell, S. C.): Partial Albino Turtle Dove, *Zenaidura macroura*, in the flesh. 30116.

DURDEN, HENRY S. (San Francisco, Cal.): Specimens of crude sulphur, soft sandstone, and clay shale from the petroleum region of Ventura County (29785); hydrocarbon on lagging and diamond drill core (29852); travertine from Tolenas Springs, Solano County (29914); specimen of onyx from near Healdsburg (30190); specimens illustrating the occurrences of petroleum, from Santa Barbara County (29955).

DWIGHT, Dr. J., jr. (New York City): Skin, nest, and eggs of Ipswich Swallow, *Ammodramus princeps*, from Sable Island. 29732.

DYAR, H. G. (New York City). 100 species of parasitic Hymenoptera. 30660.

EARLE, J. S. & SONS (Philadelphia, Pa.): Engraving entitled "Hector and Andromache." Purchase. 29678.

EARLL, R. EDWARD (U.S.N.M.): Two medals relating to the Atlanta Exposition, souvenir button of the Exposition, and also of the Baltimore Exposition (30292); two whistles and a rattle (30293).

EARSEMAN, W. A. (Pittsburg, Pa.): Oil-bearing sands from Pennsylvania, West Virginia, and Kentucky. 29601.

EASTWOOD, Miss ALICE. (See under Agriculture, Department of.)

EBY, Mrs. A. F. (See under Agriculture, Department of.)

EDGEMONT STONE COMPANY (Omaha, Nebr.): Grindstone. 30726.

EDWARDS, S. M. (Argusville, N. Dak.), transmitted by T. S. Palmer: Specimen of *Unio rectus*, Lamarck. 29597.

EHINGER, WILLIAM, Jr., Philadelphia, Pa.: Two Satinette pigeons (30174); Black-laced Blondinette pigeon (30721).

EHRENBAUM, Dr. (See under Royal Biological Station, Helgoland.)

EHRENSBERGER, FRITZ, Eichstatt, Germany: Fossil medusa. Purchase. 30812.

ELECTRIC STORAGE BATTERY COMPANY (Philadelphia, Pa), transmitted by Herbert Lloyd, general manager: Two chloride plates in cells (whitish blocks); 2 reduced chloride plates (blue metallic), and 2 completed positive plates (brown or peroxide). 29654.

ELLIOTT, R. I. (Fordham Heights, N. Y.): Blue prints of "Freezing Figures." 30572.

ELLIOTT, T. N. (Forreston, Tex.): Giant Water Bug, *Belostoma americanum*. 29555.

ELROD, M. J. (See under Agriculture, Department of.)

ELWES, H. J. (Gloucestershire, England): North American diurnal moths. Exchange. 29786.

EMMERT, J. W. (Bristol, Tenn.): Archæological objects from Hawkins County. Purchase. 30774.

ENGLISH, G. L., & Co. (New York City): Zircon from Ceylon (*A*) (29755); geological specimens (*A*). (29715); section of stalactite from Copper Queen mine Bisbee, Ariz., and a specimen of thaumasite from West Paterson, N. J. (30435.) Purchase.

ENNIS, Mrs. J. E. (Washington, D. C.): Specimen of *Adelonycterus fuscus*, in the flesh. 29696.

EVANS, ALFRED B. (Philadelphia, Pa.), Two "Napoleon jugs." 30348.

EVERETT, L. M. (Clark, Fla.): Teeth of a shark, 1 vertebra, a crab, and specimen of *Echinus*. 30535.

EVERMANN, B. W., (U. S. Fish Commission), through L. O. Howard: 21 butterflies from Idaho (29996); 5 birds' skins from Idaho (30049); 2 snakes from Canada (30311).

EXPLORING EXPEDITION, UNITED STATES, transmitted by Prof Alexander Agassiz (Cambridge, Mass.): Drawings of radiates collected by the U. S. Exploring Expedition in 1838–1842. 30176.

FARGUSSON, M. (Southport, N. C.): Plant. 30650.

FARMER, Miss SARAH J. (Eliot, Me.): Models of electrical apparatus, drawings, etc. Deposit. 30574.

FARRELL, F. H. (See under Agriculture, Department of.)

FARRINGTON, Dr. O. C. (See under Field Columbia Museum.)

FAXON, Dr. WALTER. (See under Museum of Comparative Zoology.)

FÉNYES, Dr. A. (Hélouan, Egypt): Three botanical specimens, fossils, 36 ancient and modern Grecian and Roman silver and copper coins, shells, antiquities, 79 birds' skins from Egypt and Transvaal, and about 3,000 specimens of Coleoptera from Egypt. 30800.

FERNALD, Prof. C. H. (Amherst, Mass.): Six species of Crambidæ. 30335.

FERNALD, M. L. (See under J. N. Rose.)

FERNANDEZ, ENRIQUE (San José, Costa Rica): 20 specimens of Coleopters, representing 12 species. 30591.

FERRISS, J. H. (Joliet, Ill.): Land and fresh-water shells from Lake Superior. 30359.

FETCH, Rev. J. W. (Winchester, Ky.): Back part of cranium of a specimen of *Bootherium cavifrons*. 30313.

FEWKES, Dr. J. WALTER (U. S. N. M.): Ancient Navajo war bonnet from Keams Canyon, Ariz. (30432); pair of mocassins used in the snake dance by the Moki Indians of Arizona. (30606); war shirt used by the Indians of the pueblo of St. Domingo or Isleta (30781).

FEWKES, Dr. J. WALTER—Continued. (See under Smithsonian Institution, Bureau of Ethnology.)

FIELD, Mrs. (See under National Society of the Daughters of the American Revolution.)

FIELD COLUMBIAN MUSEUM (Chicago, Ill.) Transmitted by Dr. O. C. Farrington: Limestone containing bitumen. 29602.

FIGGINS, J. D. (Kensington, Md.): Mammals and a snake. (29570, 29823, 29829, 30807.)

FINCK, HUGO (Cordova, Mexico): Collection of ferns from Cordova County. Presented to the Smithsonian Institution and transferred to the National Museum. 39646.

FINK, BRUCE. (See under Agriculture, Department of.)

FISH COMMISSION, U. S., Col. Marshall McDonald, Commissioner of Fish and Fisheries: Collection of drawings of sail and builders' plans for fishing vessels, mounted on card board, also photographs of hooks, sinkers, and apparatus used in the cod fishery (deposit) (29551); set of fishes collected by agents of the Commission (deposit) (30000); 80 birds' skins from the Pribilof Islands and other points on the western coast of the United States, 3 birds' nests from St. Paul Island and a bird egg, 28 Spermophiles from Unalaska, 2 Spermophiles from Portage Bay, Alaska, 2 squirrels from Vancouver Island, owl pellets from Popoff Island, Alaska, and a seal pup; 238 dried plants from the Pribilof Islands and Unalaska, collected by Messrs. True and Prentiss (30055); 9 birds from Alaska, collected by Mr. C. H. Townsend (30123); crustaceans belonging to the collections made by the Steamer *Albatross* in the North Pacific Ocean and Bering Sea (30126); fossil plants and a shell from Portage Bay, insects from Pribilof Island, skeleton of a fox and the body of a porpoise from St. Paul Island, 56 birds' skins from St. Paul Island and other localities, crustaceans from St. Paul Island, mollusks from the same locality, 5 birds' nests and birds' eggs from St. Paul Island and other localities, 11 skulls of fur seals and other mammals,

FISH COMMISSION, U. S.—Continued.
skull of a walrus without tusks, from St. Paul Island; shrews, mice, and lèmmings and 16 skins of fur seals from Pribilof Island, 5 pairs of deer antlers from Sitka, and a porcupine from Portage Bay, parasitic worms taken from a fur seal at St. Paul Island and geological material from various localities in Alaska, collected by Messrs. F. W. True and D. W. Prentiss (30147); Medusæ and hydroids from the dredgings of the steamer *Albatross* (30193); 300 specimens of dried mosses collected in Alaska by C. H. Townsend, of the steamer *Albatross*, during the summer of 1894–95, from the Pribilof Islands and several other islands of the Aleutian group and from Sitka (30224); natural history specimens and ethnological objects from Kamchatka and the Commander Islands, collected by Dr. Leonhard Stejneger (30232); specimen of wheat ear, plants, alcoholic specimens of birds' eggs, miscellaneous specimens from Honolulu and 30 specimens of *Dytiscus dauricus* from Unalaska, reptiles, marine invertebrates, mineral from Panama, mollusks from the North Pacific Ocean, specimen of *Thomomys bottæ*, 4 species of deep-water fishes from the Pacific Ocean (30244); skull of *Ursus* from Portage Bay, Alaskan Peninsula, collected in September, 1896, by C. H. Townsend (30250); carcasses of 8 unborn fur-seal pups, obtained by Mr. A. B. Alexander, fishery expert of the steamer *Albatross*, while detailed as naturalist to the revenue cutter *Corwin* (30388); 8 birds' skins from the coast of Nova Scotia, collected by W. C. Kendall (30289); 12 new species of fishes collected by the steamer *Albatross* in the Pacific Ocean and forwarded by Dr. D. S. Jordan, President of the Leland Stanford Junior University (30301); small collection of mollusks, made principally by W. C. Kendall (30321); collections of crustaceans, made by the steamer *Albatross* on the western coast of America from January to March, 1891, under the direction of Prof. Alex. Agassiz (30395); fishes comprising part of the collection made by the steamer *Albatross* in the North Pacific Ocean and Bering Sea in 1890–91 (30477); fishes from the upper part of the Columbia River basin, Idaho, 1894–95 (30615). (See under The Brusstar Ship Building Company.)

FISH COMMISSION, U. S.—Continued.

FISHER, JOHN H. (Brookville, Md.): Star-nose Mole, *Condylura cristata*. 30533.

FLEMING, WILLIAM (Oil City, Pa.): Limestone oil-producing rock, from Montpelier, Ind. 29633.

FLOWERS, J. J., Jr. (Bolling, Ala.): Phyllopod crustaceans. 29609.

FOETTERLE, J. G. (See under Agriculture, Department of.)

FONTLEROY, Miss JULIET. (See under Agriculture, Department of.)

FOOTE, Dr. A. E. (Philadelphia, Pa.): Geological specimens. (*A.*) Purchase. 29714.

FOOTE, Mrs. (See under National Society of the Daughters of the American Revolution.)

FORNEY, A. H. (See under E. L. Howard.)

FOSTER, GEORGE (Chicago, Ills.): Calcareous argillite and hones made from the same. 30612.

FOWLER, Prof. J. (See under Agriculture, Department of.)

FOX, W. J. (Academy of Natural Sciences, Philadelphia, Pa.): Two specimens of *Gorytes tricolor*, Cress. 29982.

FRAAS, Dr. E. (Royal Natural History Cabinet, Stuttgart, Germany): Large photograph of an *Ichthyosaurus*, showing the flesh outline. 29629.

FRANKLIN, T. W. (New York City): Monkey skins. Exchange. 30582.

FRAZAR, George B. (West Medford, Mass.): Grooved axe of diabase from Arlington, and pieces of the same material found *in situ*, from Brighton and Somerville, Mass. 30360. (See under S. C. Lummins.)

FREEMAN, JAMES R. (See under Agriculture, Department of.)

FRIERSON, LORRAINE S. (Friersons Mill, La.): Specimen of *Peromyscus aureolus* (30146); fossil fruit (30201); 2 species of Unio (30655).

FUKUSTIMA, KIMMA (Japanese legation, Washington, D. C.): Japanese God of War, carved in sandalwood and lacquered. Purchase. 30496.

FULLER, W. H. (Deerfield, Mass.): Realgar and chrome iron ore (29614); realgar and asbestus from Washington (30253). Exchange.

FUNK & WAGNALLS COMPANY (New York City): Plate illustrating gems in a high priest's breastplate. 30708.

GARDNER, A. L. (Vermilion, N. Y.): White, silky Japanese chicken. 29539.

GARNER, R. L. (New York City): Kola nuts. 30455.

GARRATT, CHARLES (Hot Springs, Ark.): Forty-one specimens of distorted and modified quartz crystals (30075); specimens of quartz and magnetite (30298).

GARVIN, W. D. (Boyce Va.): Specimen of *Mutilla occidentalis*. 29688.

GAYLE, E. E. (See under Agriculture, Department of.)

GEDNEY, E. G. (See under Agriculture, Department of.)

GEIGER, W. M. (Catawissa, Pa.): Fragments of pottery from near Beaver Valley. 30058.

GEISMAN, JACOB (Philadelphia, Pa.): Three casts of parts of *Hyracotherium venticolum;* 2 casts of young and old *Protohippus brachiops,* and 1 cast of *Protohippus mirabilis*. 30028.

GEOLOGICAL SURVEY, OTTAWA, CANADA. (See under Agriculture, Department of.)

GEORGE, IRA R. (Ashton, Ill.): Ear of corn, showing a curious growth. 30732.

GERMANSKY, A. L. (New York City): Two Hebrew Bibles. (*A.*) Purchase. 29658.

GERRARD, EDWARD (Camden Town, London, England): Three specimens of Paradise Birds, *Parotia lawsei* and *Paradisea raggiana*. Purchase. 29910.

GIBBONS, J. R. (Linwood, Ga.): Four hundred pounds of bauxite. 30386.

GIGLIOLI, Prof. HENRY H. (Director, Royal Zoological Museum, Florence, Italy): Ethnological and archæological objects from Europe, Asia, Africa, and Australia. Exchange. 30742.

GILBERT, Mr. (See under Interior Department, United States Geological Survey.)

GILBERT, G. K. (See under Agriculture, Department of.)

GILDER, R. W. (New York City): Poem on the life mask of Abraham Lincoln. 30023.

GILLETTE, Prof. C. P. (Fort Collins, Colo.): Collection of Cynipidæ, including type specimens. 30043.

GLEN ISLAND MUSEUM (Glen Island, N. Y.), transmitted by L. M. McCormick: Two pairs of sandals from Aden (39752); skin of a buffalo calf, *Bison americanus* (30005); collection of ethnological objects, basketry, carving, matting, etc., from New Zealand (30021); specimen of macaw, in the flesh (30334); turtle, hedgehog, fishes from the Red Sea, shells and mollusks from the Red Sea and Gulf of Aden, marine invertebrates from the Red Sea, specimens of crabs and Echini (30413). Exchange.

GLOVER, Rev. A. K. (Appleton, Wis.): Metal coins and paper money. 29581.

GODBEY, Rev. S. M. (Morrisville, Mo.): Specimen of *Unio spatulatus,* Lea. 30007.

GOLDMAN, Mr. (See under Agriculture, Department of.)

GOODE, Dr. G. BROWN, Assistant Secretary U. S. National Museum: Two musical instruments (purchased for the Museum) (29592); Testament of Bishop Asbury, the New Testament by Tischendorf, Parallel Revised and Authorized Versions of the New Testament, Hieroglyphic Bible. (*A.*) Deposit. 29795. (See under Mrs. Eva Scott Muse and Smithsonian Institution, U.S.N.M.)

GOODELL, SAMUEL. (See under Agriculture, Department of.)

GOODRICH, Rev. J. B. (Claremont, N. H.): Specimen of *Orthalicus*. 30278.

GORMAN, M. W. (See under Agriculture, Department of.)

GOULD, C. N. (Maple City, Kans.): Two species of Permo-Carboniferous fossils (30272); specimen of *Griffithides scitula,* an upper Carboniferous trilobite (30504). (See under Agriculture, Department of.)

GRANT, Col. CHARLES COOTE (Hamilton, Ontario, Canada): Large collection of Clinton and Niagara group fossils. Exchange. 30020.

GREEN, E. E. (Punduloya, Ceylon): Collection of Hymenoptera. 30608.

GREENE, Prof. E. L. (Catholic University, Washington, D. C.): Five plants. 30035. (See under Agriculture, Department of.)

GREGER, D. K. (Fulton, Mo.): One hundred and twenty specimens of Hamilton formation fossils, principally Brachiopods, representing 25 species (exchange) (30082); Devonian shale containing brachiopods (gift) (30610).

GRIFFITH, A. L. (See under Agriculture, Department of.)

GRIM, W. M. (Brookfield, Wash.): Specimen of Shrew, *Sorex trowbridgei*. 30826.

GRINNELL, G. H. (See under Agriculture, Department of.)

GRISWOLD, N. L. (Peoria, Ill.): United States land patent, signed by President James Monroe in the year 1817. 30728.

GROVER, W. E. (Galveston, Tex.): Eggs of Black Skimmer, *Rynchops nigra* (29778); eggs of *Catharista atrata* (30474).

GUESDE, L. (Pointe-à-Pitre, Guadeloupe): Drawings of stone implements. 29775.

GUILFOYLE, W. R. (See under Melbourne Botanical Gardens.)

GUTHRIE, OSSIAN (Chicago, Ill.): Board sawed from a log found in a glacial drift. 30307.

GUYE, Mr. and Mrs. F. M. (Seattle, Wash.): Two fossil palms from the Cascade Mountains. 30199.

GWYN, Dr. C. L. (Galveston, Tex.): Tertiary bivalve shells (29939); 8 species of Unionidæ from Texas, and one specimen of *Ampullaria* from Honduras (29976).

HAAS, B. F. (Brightwood, D. C.): Specimen of *Phacops rana*, Green. 30168.

HADDON, Dr. A. C. (Inisfail Hills Road, Cambridge, England): Papuan ethnological objects from New Guinea. Exchange. 30002.

HAGGATT, E. A. (Fort Bayard, N. Mex.): Specimen of *Dynastes granti*, Horn. 30494.

HAGUE, ARNOLD (U. S. Geological Survey): Geological material from Arizona and the Black Hills, S. Dak. 30515.

HALL, Mrs. C. C. (Westport Point, Mass.): Specimens of *Botrychium ternatum* (Thunb.) Swartz, representing a single polymorphous species. 29828.

HALL, W. C. (Creston, Iowa): Mounted slide showing specimen of *Distomum felineum*. 29957.

HALSTED, D. J. (See under Agriculture, Department of.)

HAMMAR, J. W. (Washington, D. C.): Collection of marine shells from Santa Rosa Sound, Fla. 29844.

HAND, ALFRED. (See under Dr. T. H. Bean.)

HANNAH, R. H. (Olympia, Wash.): Stone implement. 29940.

HANNIBAL WATER COMPANY (Hannibal, Mo.), transmitted by C. J. Lewis, superintendent: Shells taken from the city water mains. 29553.

HANSELMAN, J. J., (Brooklyn, N. Y.): Montaubon Pigeon. 30120.

HAPPER, Mrs. F. A. (Washington, D.C.): Skin and skull of an Armadillo (*Tatusia 9-cincta*). 29894.

HARDEMAN, THOMAS (Birmingham, Ala.): Four specimens of *Melanophila notata*. 30702.

HARE, Mrs. W. B. (Tacoma, Wash.): Shells and marine invertebrates from Puget Sound. 30356.

HARRISON, A. K. (Lebanon Springs, N. Y.): Marine shells from the coast of New England. 29754. (See under Agriculture, Department of.)

HARRISON, B. (Ightham, Kent, England): Twenty-four rude chipped-flint implements. Purchase. 30109.

HARTLAND, O. H. (Wilkesbarre, Pa.): Fossil teeth of mammals. 30379. (Returned.)

HARVEY, F. L. (Orono, Me.): Skeleton of a hooded seal. (purchase.) (30607); 3 specimens of Shrew (*Blarina brevicauda*), and 2 specimens of *Sorex personatus* (?) (gift). (30280.) (Two returned.)

HASKELL, G. W. (Washington, D. C.): Collection of pipes, beadwork, bow and arrows, parts of costumes, etc., obtained from the Ojibwa Indians. Purchase. 29809.

HATCHER, J. B. (See under Interior Department, U. S. Geological Survey, and Princeton College.)

HAUER, Dr. FRANZ RITTER VON. (See under Imperial Royal Natural History Museum.)

HAVILAND, G. D., Museum of Zoology. (Cambridge, England): Three specimens of termites from Borneo and Natal. Exchange. 29920.

HAY, W. P. (Washington, D. C.): Amphipods and Isopods. Exchange. 30541.

HAWLEY, F. S. (Broadalbin, N. Y.): Wheel head of a spinning wheel, in which the spindle revolves in corn-husk bearings. 30825.

HAYDEN SURVEY. (See under Agriculture, Department of.)

HEADE, M. J. (St. Augustine, Fla.): Egg-mass of Mantis. 30670.

HECKMAN, J. C. (Allegheny, Pa.): Iron ochre from England. 30447.

HEIGHWAY, A. E. (Murphy, N. C.): Talc from North Carolina (29712); specimens of staurolite crystals from Georgia (30297); talc from Kinsey mine, N. C. (30738).

HELD, C. F. (Washington, D. C.): Snake. 30725.

HELLER, A. A. (See under Agriculture, Department of.)

HELTON, O. P. (Shelbyville, Ill.): Rude stone implements from bowlder clay. 30466.

HEMPHILL, HENRY (San Diego, Cal.): Fossils (30239); marine mollusks (30241); marine shells and specimens of *Cerithium* from Florida (30418).

HERMAN, THEO. & CO. (San Francisco, Cal.): Two specimens of *Murex nigritus*, Phil., from Lower California (30061); marine bivalves from La Paz, Mexico, (30145).

HESTER, L. G. (Houston, Tex.): Rude chipped implements and arrowheads of flint. 30302.

HETHERINGTON, J. P. (Logansport, Ind.): Minerals. (29481, 29887.)

HEYDE, Rev. H. T. (New Orleans, La.): One hundred and eighty-four birds' skins from Panama, Costa Rica, and Central America. Purchase. 29554.

HEYMANN, S. (Fayetteville, Tenn.): Specimen of phosphate. 29540.

HIATT, J. W. (New Harmony, Ind.): Photographs of Robert Owen, David Owen, William McClure, Thomas Say, and the building of the Workingmen's Institute (30652); photograph of Dr. David Dale Owen (30696).

HICKS, G. H. (See under Agriculture, Department of.)

HIGH SCHOOL MUSEUM (Saginaw, Mich.), transmitted by Miss Helena E. Oakes, curator: Moccasin obtained from the Ojibwa Indians. 30083.

HILL, W. W. (Jamesburg, N. J.): Rude chipped implements, arrowheads and scrapers, fragments of pottery, and other objects. 30246.

HILLMAN, F. H. (See under Agriculture, Department of.)

HINDSHAW, H. H. (See under Young Naturalists' Society, Seattle, Wash.)

HINE, T. W. (Phœnix, Ariz.): Lithographic stone. 29686.

HODGE, F. W. (See under Smithsonian Institution, Bureau of Ethnology.)

HOLM, THEODOR. (See under Agriculture, Department of.)

HOLMES, I. S. (Bowmans Bluff, N. C.): Larva of Noctuid Moth, *Homoptera calycanthata*. 30776.

HOLMES, SAMUEL J. (Chicago, Ill.): Three anomourans. 30072.

HOLZNER, FRANK X. (San Diego, Cal.): Skin and skull of a Shrew (*Notiosorex crawfordi*) (29674); 21 skins of small mammals (30682). Purchase.

HOOPES, B. A. (Organ, N. Mex.): Two specimens of Scaled Quail, *Callipepla squamata*. 30620.

HOPPING, RALPH. (See under Agriculture, Department of.)

HORNIMAN MUSEUM (London, England, transmitted by Richard Quick, curator): Ethnological objects, fragments of pottery, 3 stone implements, human skull, and mammal bones; also specimen of peat. Exchange. 29853.

HORNSTEIN, L. (Exhibit at the Cotton States and International Exposition, Atlanta, Ga.): Five pieces of Hiawatha ware from Bohemia, and 15 pieces of Bohemian glassware. Purchased by Dr. Goode for the National Museum. 30322.

HORNUNG, Dr. J. (Washington, D. C.): Twenty-five species of birds from various localities. Exchange. 29811.

HOUGH, Miss CLARA (Morgantown, W. Va.): Cream pitcher and 2 decorated flowerpots made of old salt-glaze stoneware from the Morgantown Pottery, manufactured about 1873 by Greenland Thompson. 30088.

HOUGH, F. C. (Morgantown, W. Va.): Skull of a swan (29998); punched iron lantern (30261).

HOUGH, WALTER (U. S. National Museum): Chinese block for divining Kau piri (29816); brass pulpit lamp

HOUGH, WALTER—Continued.
used in 1849, 24-tubed candle molds, coiled straw bread-raising basket, luminous match safe, and a "walking-stick" (toy) (30062); 2 fragments of pottery from a ruined pueblo near Winslow, Ariz. (Collected for the Museum) (30813).

HOWARD, ERNERT L. (Herndon, Va., through A. H. Forney): Three Wild Turkey chickens. 30785.

HOWARD, L. O. (See under Evermann, B. W.)

HOWARD, S. W. (Hagersville, Ontario. Canada): Two specimens of *Calymene platys* and a specimen of *Phillipsastrea*. 30019.

HOWE, MARSHALL A. (See under Agriculture, Department of.)

HOWELL, E. E. (Washington, D. C.): Specimens of minerals (purchase) (29625); 2,650 specimens of Middle Cambrian fossils from Newfoundland and St. David's, Wales (purchase) (29691); geological specimens (exchange) (29718); geological material (*A*) (purchase) (29779).

HOWELL, THOMAS. (See under Agriculture, Department of.)

HUBBARD, H. G., (Department of Agriculture): Parasitic worms from a mocassin snake and a rattlesnake (29930); two ticks from an opossum (29975); Tree Toad and Buzzards from the West Indies (30326); type specimens of *Epizeuxis gopheris*, Smith, from Fla. (30383.)

HUGHES, H. F. (Harbor, Oreg.): Two hydroids, and a specimen of borate of lime. 30339.

HUNTER, THOMAS G. (Los Angeles, Cal.): Pair of sandals from San Gabriel Mission; also archaeological objects. 30066.

HUNTER, W. D. (University of Nebraska, Lincoln, Nebr.): Three type specimens of *Tropidia nigricornis*, Hunter. 30711.

HURTER, JULIUS (St. Louis, Mo.): Four reptiles and batrachians. Exchange. 30342.

HUTCHINSON, Miss H. D. (Mattapan, Mass.): Specimen of *Solen* from Revere, Mass. 30749.

HUTCHINSON, Dr. W. F. (Winchester, Va.): Specimen of Black-capped Petrel, *Aestrelata hastata*, from Virginia. Exchange. 30692.

HUTTON, W. McG. (Buffalo City, N. C.): Stag Beetle, *Lucanus elaphus*. 29890.

HYATT, Prof. ALPHEUS. (See under Interior Department, U. S. Geological Survey.)

IHERING, VON, DR. H. (Director of the Museo Paulista, São Paulo, Brazil): Fresh-water, land, and marine shells, from Mexico and South America. 30815.

IMPERIAL ROYAL NATURAL HISTORY MUSEUM (Vienna, Austria), transmitted by Dr. Franz Ritter von Hauer: Fourteen species of echinoderms dredged by H. M. S. *Pola* in the eastern Mediterranean Sea during 1890–1894. Exchange. 30212.

INTERIOR DEPARTMENT, Hon. Hoke Smith, Secretary.

U. S. GEOLOGICAL SURVEY, Mr. Chas. D. Walcott, Director: A series of 22 photographs illustrating the mechanics of Appalachian structure (29559); specimens of goslarite from Gagñon Mine, Butte, Mont., collected by R. H. Chapman (30136); tooth of a mastodon found in Oregon (30155); 12 specimens of carboniferous insects and 5 specimens of carboniferous fish scales obtained by Mr. David White (30219); geological material obtained by Prof. G. R. Gilbert (30281); 11 species, represented by 77 specimens, of Calciferous and Chazy Cephalopoda studied by Prof. Alpheus Hyatt, Boston, Mass. (30286); Pliocene fossils from near Long Island, Kans., collected through Prof. O. C. Marsh (30316); large transparency-relief map of the United States, showing oil fields, from the exhibit of the Interior Department at the Atlanta Exposition (30332); collection of vertebrate fossils collected through Prof. O. C. Marsh (30338); free gold in calcareous quartzite, from Kings Mountain, N. C., transmitted by Dr. David T. Day (30346); 28 Green River (Eocene) fossil fishes, purchased by the Survey for their exhibit at Atlanta (30350); specimens of sandstone showing wind carvings, from Colorado (30491); vertebrate fossils, collected by J. B. Hatcher near Dayton, Kans. (30587); a collection of rocks from the Castle Mountain district of Montana, collected by Walter H. Weed (30600); geological material from Cripple Creek, Colo., collected by

U. S. GEOLOGICAL SURVEY—Continued. Whitman Cross and R. A. F. Penrose, jr. (30601); 76 specimens of fossils from the Ocoee formation of Tennessee, and 13 microscopic sections, collected by Mr. C. D. Walcott (30706); 8 specimens of rock from Big Belt Mountains, Montana, collected by Mr. C. D. Walcott (30707); a series of Algonkian rocks from the Grand Canyon of Arizona and from New York and Texas, collected by Mr. C. D. Walcott (30749); 85 specimens of rock from the Cambrian system of New York, Vermont, and Texas, collected by Mr. C. D. Walcott (30750); 11 specimens of intraformational conglomerates collected by Mr. C. D. Walcott (30751); fresh limetsone and residual clay from Virginia (30792).[1] (See under E. J. Kennedy.)

U. S. PATENT OFFICE: Franklin Printing Press. Deposit. 30157.

JACKSON, DAVID. (See under Agriculture, Department of.)

JAMAICA, INSTITUTE OF (Kingston, Jamaica), transmitted by J. E. Duerden, Acting Secretary: Specimen of Dynastid Beetle, *Megasoma elephas*, Fab., from Boca del Toro, Colombia (deposit) (29923); specimen of *Atya scabra*, Leach (gift) (30276).

JAMES, Dr. J. F. (Mount Pleasant, D. C.): Specimen of *Limax maximus*, Linn. 29566.

JANNEY, Prof. B. T. (See under Breed, Estate of Dr. Daniel.)

JAPANESE FAN COMPANY (New York City): Bronze and ivory figures and vases. Purchase. 29810.

JARVIS, P. W. (Kingston, Jamaica): Specimens of crustaceans. (29856, 29986, 30112, 30337, 30564, 30744). Exchange.

JENSEN, LAWRENCE (East Gloucester, Mass.): Hull of the first screw propeller steamboat built by Col. John Stevens in 1804 (*A*). Purchase. 29635.

JEPSON, W. L. (See under Agriculture, Department of.)

JERICHAU, Professor (Washington, D.C.): Torso of Eros; torso of Dionysius; head of Poseidon; jaw of a faun; head, foot, and torso. Deposit, 30622.

JEWETT, Mrs. (Washington, D.C.): Musical instrument. Deposit. 30719.

JOHNSON, J. E. (Richmond, Va.): Arrow reeds from Isle of Wight County, Va. 30505.

JOHNSON, J. F. (Toledo, Oreg.): Campsonite (?), from sec. 29, T. 9 S., R. S. W., Willamette meridian. 29556.

JOHNSON, W. G. (Urbana, Ill.): Parasitic Hymenoptera, consisting of 6 specimens of *Hadronotus carinatifrons*, Ashm., and 4 specimens of *Tetrastichus johnsoni*, Ashm. 30755.

JOHNSTON, Capt. J. R. (Pittsburg, Pa.): Eight pottery vessels from Tennessee, Kentucky, and Illinois. Exchange. 30588.

JOHNSTON, Lieut. W. B. (Golden Pond, Ky.): Specimen of *Plectrodera scalator*, Fab. 29621.

JONES, John D. (Rileyville, Va.): Specimen of jasper. 30641.

JONES, MARCUS E. (See under Agriculture, Department of.)

JORGENSEN, S. M. (Copenhagen, Denmark): Bronze medal struck in commemoration of M. Julius Thomson's seventieth birthday. Presented to the Smithsonian Institution, and transferred to the National Museum. 30689.

JUDD, ELMER T. (Cando, N. Dak.): Skin and set of eggs of Baird's Sparrow, *Ammodramus bairdi*, and two sets (eight eggs) of McCown's Longspur, *Rhynchopanes mccownii* (29888); eggs of Baird's Sparrow, Chestnut-collared Longspur, with 2 eggs of a cowbird in one of the nests (30295).

JUDSON, W. B. (Los Angeles, Cal.) through Major Bendire: Two specimens of Wren Tit (*Chamæa*). 29971.

KAHN, DAVID (Washington, D. C.): Ear bone of a drumfish, used as a charm, from Put in Bay, Ohio. 30780.

KALDING, H. B. (Drytown, Cal.), transmitted by Dr. R. W. Shufeldt: Skeleton and viscera of an abnormal chicken. 30211.

KAN KO BA (New York City): Chinese and Japanese pottery. Purchase. 29610.

[1] A collection of vertebrate fossils deposited in 1892 (Acc. 25345), and referred to under the Interior Department in the Museum Report for 1892, has now been formally presented to the Museum.

KARLSIVE, Dr. W. J. (Washington, D. C.): Specimen of *Lucanus elaphus* from Hot Springs, Ark., (exchange) (30500); male and female type specimens of *Lachnosterna karlsivei*, Linell, from the same locality (gift) (30680).

KEARNEY, N. J. (Thedford, Ontario, Canada): Slab of tentaculites, specimen of pentremitidea, 2 specimens of *Arthracantha*, an undetermined crinoid, and a specimen of *Stropheodonta demissa* with crania. Exchange. 30016.

KEARNEY, T. H. (See under Agriculture, Department of.)

KELLY, A. E. (Port Clinton, Ohio): Specimen of *Stercorarius parasiticus*, in the flesh. 30053.

KELSEY, F. D. (See under J. N. Rose.)

KEMEYS, EDWARD (Chicago, Ill.): Collection of sculptures. Presented to the Smithsonian Institution and deposited in the National Museum. 29898.

KEMP, J. F. (New York City): Geological material. Exchange. 30597.

KENDALL, W. C. (See under Fish Commission, U. S.)

KENNEDY, CLARENCE (Rockport, Ind.): Thirty-three flint arrowheads, scrapers, and fragments of pottery. 29725.

KENNEDY, E. J. (Troy, Pa.), through U. S. Geological Survey: Fossil fishbones, and 10 specimens of Devonian fish plates. Exchange. (30446, 30705.)

KENT, A. J. (Bonners Ferry, Idaho): Stone implement from Kootenai County. Exchange. 30108.

KERN, C. E, (Washington, D. C.): Eighty-five birds' skins from Nicaragua and Costa Rica, and a nest of a hummingbird. 30056.

KERNAHAN, GEORGE (Thedford, Ontairo, Canada): Large collection of invertebrate fossils. Exchange. 30015.

KING, Dr. C. (Monroe, La.): Specimen of *Emesa longipes*, Say. 29970.

KINNEY, ABBOT. (See under Agriculture, Department of.)

KIRK, Miss EVA L. (See under H. Q. Adams.)

KIRSCH, Dr. P. H. (Columbia City, Ind.): Twenty-four species of Unionidæ from northern Indiana. 30138.

KLAGES, HENRY G. (Jeannette, Pa.): Collection of native and exotic insects. Exchange. 30415.

KNIGHT, ORA W. (Bangor, Me.): Eggs of Cormorant. 30170.

KNIGHT, Prof. W. C. (University of Wyoming, Laramie, Wyo.): Two specimens of *Crassatella* from the Cretaceous sandstones of Oil Mountain, Natrona County, Wyo. 30015.

KNIGHTLEY, E. L. (See under Agriculture, Department of.)

KNOWLES, W. A. (U.S.N.M.): Drilled ceremonial object from Rock Creek, Md. 30372.

KNOX, M. V. B. (Wahpeton, N. Dak.): Fragments of pottery from North Dakota. 30565.

KNY, RICHARD & CO. (New York City): Anatomical models (*A.*) (purchase). (29604, 29876, 29949). Purchase.

KOCHER, Dr. J. F. (South Whitehall, Pa.): Old style apple-parer (gift) (30059); an old-fashioned loom (deposit) (30060); model of a tape-loom (gift) (30351).

KRANTZ, Dr. F. (Bonn-a-Rhein, Germany): Four fossil medusæ from the Jura formation of Solenhofen, Germany. Purchase. 30627.

KRAUSS, ALFRED, U. S. consular agent, (Zittau, Germany): Tertiary columnar sandstone and samples of the material surrounding it (29958); Cretaceous fossils and specimens of Tertiary lignite (36465).

KREKO, GABRIEL DE (Concord, N. H.): Armenian purse, watch-case, necklace, and stockings. 30519.

KREMER, Rev. E. N. (Harrisburg, Pa.): Fourteen stone implements. Deposit. 29984.

KULZHINSKI, S. (See under Lubny Museum.)

KUNZ, GEORGE F. (New York City): Brass badge of the 18th Hussars and 2 pieces of load-stone from Magnet Cove, Ark. 29792. (See under Charles L. Tiffany.)

LA PLATA MUSEUM (La Plata, Argentina, transmitted by Dr. F. P. Moreno, director): Reptiles, ores, birds' and mammal skeletons, Paleozoic, Mesozoic, and Tertiary fossils, birds' skins, and skin, with skull, of *Cervus chilensis*. Exchange. 30571.

LACOE, R. D. (Pittston, Pa.): Specimens of fossils from the Dakota Group, Paleozoic vertebrate fossils, fossil fishes,

LACOE, R. D.—Continued.
and specimens from a Sigillarian stump, constituting a portion of the "Lacoe collection." (30266, 30581.)

LAFLER, H. A. (De Witt, Nebr.): Seven specimens of *Apus lucasanus*, Packard (gift) (29608); specimens of *Apus lucasanus* (exchange) (29846); 3 species of fresh-water crustaceans (gift) (30737).

LAGAI, Dr. G. (New York City): Young Hawk's-bill Turtle. 29782.

LAMB, Dr. D. S., U. S. A., Army Medical Museum: Parasitic worms, collected by Dr. M. M. Brewer. 29929.

LAMB, T. H. P. (Saskatchewan, Canada): Skin and set of eggs of Arctic Horned Owl. 30730.

LAMSON-SCRIBNER, Mr. F. (See under Agriculture, Department of).

LANGLEY, Mr. S. P., Secretary, Smithsonian Institution: Three specimens of rock salt from Baden-Baden. 29995. (See under Schweinburg, Fraulein Victoria.)

LATCHFORD, F. R., (Ottawa, Canada): Three species of land and fresh-water shells. 30443.

LATTIN, FRANK H. (Albion, N. Y.): Hen's egg of abnormal shape. 30743.

LAUN, JOHN (Petersburg, Va.); transmitted by Quartermaster-General's Office: Silver watch. 30459.

LEACH, Dr. C. V. (East Joplin, Mo.): Specimen of *Diapheromera*, sp. 29950.

LEE, HENRY E. (Bryant, S. Dak.): Eggs of Prairie Hen, *Tympanuchus americanus*, Bartramian Sandpiper, *Bartramia longicauda*, and Mourning Dove, *Zenaidura macroura*. 30538.

LEE, THOMAS (transmitted by C. H. Townsend): Skin of Black Skimmer, *Rhynchops nigra*, from South Carolina. 30589.

LEFF, GERHARD. (See under Agriculture, Department of.)

LEGGAT BROTHERS (New York City): Facsimile copy of the Bible used by Cromwell's soldiers. (*A.*) Purchase. 29797.

LEHMAN, W. V. (Fremont, Pa.): Five species of Unios from Florida and Tennessee. 30810.

LEIBERG, JOHN B. (See under Agriculture, Department of.)

LEMKE, Miss ELIZABETH (Berlin, Germany): Loom, shuttle and toy, 2 geological specimens, and a collection of plants. 30343.

LEMON, Dr. JOHN H. (New Albany, Ind.): Specimens of St. Louis group fossils from Edwardsville and Moorsville, Ind. (29574); 27 specimens of Keokuk group of *Spirifer* (29650); 18 specimens of Keokuk fossils from Betting's quarry, Ind. (29692); 76 specimens of Keokuk group fossils from Bettinger's quarry, 16 specimens from Neafus quarry, and 2 specimens of *Derbya keokuk* from Spikert's roadcut, Ind. (29980.)

LEUCKART, Prof. RUDOLPH (Zoological Institute, Leipzic, Germany): Specimen of *Bertia mucronata*, Lk., and 2 specimens of *Tænia rhopalicephala*, Riehm. (exchange) (30024); through Mr. C. D Walcott, 4 plaster casts of medusæ in the collection of the K. Mineralogisch-geologischen Museum, Dresden (gift) (30633).

LEWARS, Rev. W. H. (Annville, Pa.): Grooved ax. 30259. (See under Dr. E. H. Marshall.

LEWIS, C. H. (Broadhead, Wis.): Human skull from a mound in Wisconsin. Exchange. 30331.

LEWIS, CHARLES J. (See under Hannibal Water Company.)

LEWIS, G. A. (Wickford, E. I.): Four specimens of Black Rudder-fish, *Leirus perciformis*. 29774.

LINDSAY, Mrs. (See under National Society of the Daughters of the American Revolution.)

LINTNER, Professor. (See under Agriculture, Department of.)

LLOYD, HERBERT. (See under Electric Storage Battery Company.)

LOCHMAN, C. N. (See under Agriculture, Department of.

LONG, Capt. J. H. (See under Treasury Department, U. S. Life-Saving Service.)

LONG, S., & SON (Hancock, Pa.): Manufactured ochre. 29588.

LOVE, Mrs. E. G. (New York City): Specimen of *Phygadeuon mucronatum*, 2 specimens of *Cryptus extrematus*, and 3 specimens of *Olibrus semistriatus*. 30375.

LOVETT, EDWARD (Croydon, England): Ethnological objects. Exchange. 30100.

LOWE, H. N. (Pasadena, Cal.): Shells from San Pedro Bay. Exchange. 30441.

LOWE, Dr. J. H. (Holum, La.): Geological material. 30011.

LUBNY MUSEUM (Madam N. N. Skarjinski, Poltava, Little Russia): Transmitted by S. Kulzhinski, secretary: 6 musical instruments, ethnological objects, photographs, and drawings. Exchange. 30688.

LÜDERS, Dr. C. W. (Ethnographic Museum, Hamburg, Germany): Six photographs showing stone figures, implements, and pottery from Mexico and Central America. 30191.

LUGENBEIL, H. G. (U. S. N. M.): Catbird, *Galeoscoptes carolinensis*, in the flesh. 29694.

LUMMINS, S. C. (Buffalo Gap, S. Dak.), through G. B. Frazar: Grooved club or hammer. 30399.

LUNDBOHM, H. (Stockholm, Sweden): Gadolinite and cerite from Sweden. Purchase. 29622.

LYCETT, EDWARD (Atlanta, Ga.): Two frames containing 6 specimens of "Persian luster" tiles (30323); Dresden china tray or card-receiver (30422); 6 pieces of pottery (30736). (See under William Lycett.)

LYCETT, WILLIAM (Atlanta, Ga.), transmitted by Edward Lycett: Two cups and saucers of Japanese egg-shell porcelain, and 2 vases of the same material decorated by Edward Lycett, and taken from the William Lycett collection. 30423.

LYMAN, DON (Perry, Oreg.): Specimen of *Cuterebra americana*, Fab. 29916.

MCCAFFREE, R. I. (Columbia, Ky.): Specimen of Rhinoceros Beetle, *Dynastes tityus*. 29536.

MCCHESNEY, JOHN D. (See under Frederick A. Vogt.)

MCCORMICK, L. M. (See under Glen Island Museum.)

MCDONALD, Col. MARSHALL. (See under Fish Commission, U. S.)

MCELROY, Mrs. K. T. P. (Washington, D. C.): Reptiles and insects from the vicinity of Gualan, Guatemala. 30508.

MCGEE, W J (Bureau of Ethnology, Washington, D. C.): Porcupine-fish and two tails of *Raia* from the Gulf of California (30403); specimen of *Hadrurus hirsutus*, Wood, from Tiburon Island, Gulf of California (30489). (See under Agriculture, Department of, and Smithsonian Institution, Bureau of Ethnology.)

MCGEE, W. L. (See under Agriculture, Department of.)

MCGREGOR, R. C. (Palo Alto, Cal.): Skins of *Agelaius gubernator* and *Xanthocephalus xanthocephalus*, (albino) (30614); 119 birds' skins from California, Colorado, and Massachusetts (30745).

MCGUIRE, J. D. (U. S. N. M.): Pipe of chloritè from Norfolk, Va., and a pipe-head of clay from the mouth of South River, Maryland. 30220.

MCGUIRL, J. H. (Ottawa, Canada): Fossil fish. 30358.

MCILHENNY, E. A. (Avery, La.): Eighteen birds' skins (39548); 15 birds' skins (30623); 9 specimens of Red-winged Blackbird, *Agelaius phœniceus* (29742); 4 specimens of King Rail, *Ballus elegans* (29812).

MCKINLEY, C. (Charleston, S. C.): Ant, *Myrmica* sp. 30559.

MCKINNON, MALCOLM (Thedford, Ontario, Canada): One hundred and eighteen specimens of fossils. 30017.

MCLELLAN, J. E. (See under Agriculture, Department of.)

MCLEMORE, TIPTON (South Greenfield, Mo.): Fifty-three arrowheads. Exchange. 30434.

MCMILIAN, P. A. (Banyan, Fla.): Red-headed woodpecker, and a clay vessel (29824, 30130).

MCNEILL, JEROME (Fayetteville, Ark.): Dermal horns. 30291.

MACINTOSH, R. (Thedford, Ontario, Canada): Specimens of fossils. Exchange. 30013.

MACKAY, G. H. (Boston, Mass.): Specimen of Dowitcher, *Macrorhamphus griseus*, from Nantucket (29985); 7 specimens of shore birds (30074).

MACMILLAN & Co. (New York City): Copy of "Atlas of Karyokinesis and Fertilization of the Egg." By Edmund Wilson. Purchase. 29973.

MACOUN, J. M. (See under Agriculture, Department of.)

MAGRUDER, JULIAN (Cherrydale, Va.): Flying Squirrel, *Sciuropterus volucella*, in the flesh. 30150.

MALLY, F. W. (See under Agriculture, Department of.)

MARLATT, C. L. (See under Agriculture, Department of.)

MARASHLIAN, S. S. (New York City): Turkish coin (Chairak) dated 1293 of the Hegira. 30516.

MAREAN, J. B. (Washington, D. C.): Broad-winged Hawk, *Buteo latissimus*, in the flesh, from Maryland. 29911.

MARSH, Prof. O. C. (New Haven, Conn.): Two charts showing restorations of extinct animals. 30119. (See under Interior Department, U. S. Geological Survey.)

MARSHALL, Dr. E. B. (Annville, Pa.), transmitted by Rev. W. H. Lewars: Grooved ax. 30260.

MARSHALL, GEORGE (Laurel, Md.): Herbarium specimens of *Habenaria lacera, Limodorum tuberosum; Sarracenia purporea*, L.; specimens of *Adelonycterus fuscus*, and *Atalapha noveboracensis* (29573, 29577, 29689, 29770, 29850).

MARSHALL, HENRY (Smithsonian Institution): King Eider Duck. 30164.

MARX, Mrs. MINNIE (Washington, D. C.): Collection of Arachnida belonging to the late Dr. Marx. Deposit. 30653.

MASON, Prof. O. T. (U. S. National Museum): Nineteen sheets containing portraits of prominent men and women. 30683.

MATHERS, WALLACE (Cambria, Cal.); Eggs of Turkey Buzzard, *Cathartes aura*, and American Crow, *Corvus americanus*. 30803.

MATTHEWS, Miss M. R. (Chatham, N. J.): Hellgramite-fly, *Corydalus cornutus*, and Owl Moth, *Catocala concumbens*. 29589.

MATTHEWS, P. F. (Florence, Ala.): Box-tortoise from near Florence (gift) (29580); archæological objects from the bottom lands of the Tennessee River and Cypress Creek, Ala. (deposit), (29655); 817 archæological objects from Michigan and Alabama (deposit) (returned) (29907).

MATTHEWS, R. S. (U. S. National Museum): Specimens of *Leptoglossus oppositus* with eggs, and *Pelidnota punctata*, mammals, reptiles, batrachians, and land shells (29567); small collection of skins and skulls of mammals from the District of Columbia (29766).

MATTHEWS, Dr. WASHINGTON, U. S. A. (Army Medical Museum, Washington, D. C.): Collection of paints obtained from the Moki and Navajo Indians, and 3 fragments of pottery pipes from Fort Wingate (gift) (30086); a sock and sandal from the cave-dwellings (exchange) (30151). (See under Agriculture, Department of.)

MATTHEWS, Mrs. WASHINGTON (Washington, D. C.): Clay fetish from a Cañon near Zuñi. 30674.

MAYER, ROBERT & Co. (New York City): Chromolithographic show-card, "Bouquet of Roses," after Paul de Longpré. 30635.

MAYNARD, GEORGE C. (See under Henry A. Reed, and The Telegraphic Historical Society of North America.)

MAZYCK, WILLIAM G. (Charleston, S. C.): Five specimens of *Bulimus ventricosus*, Drap., from Sullivan's Island, Charleston Harbor (gift) (30041); 10 species of shells from the same locality (exchange) (30553).

MEANS, THOMAS H. (Department of Agriculture): Limestone and residual soil from Clarksville, Tenn. 30796.

MEARNS, Dr. EDGAR A., U. S. A. (Fort Myer, Va.): Small collection of mammals from Fort Myer, Va., and Gettysburg, Pa., (29772); Box-turtles from Virginia (30285); specimen of *Scalops aquaticus* (30425); 2 specimens of Kangaroo Rat, *Dipodomys merriami*, and a specimen of *Peromyscus eremicus* from Tiburon Island, Gulf of California (30445).

MEARNS, Master L. Z. (Fort Myer, Va.): Set of eggs of Ovenbird, *Sciurus aurocapillus*, from Virginia. 30659.

MEEK, Prof. S. E. (Fayetteville, Ark.): Crayfishes (30200); skull of *Equus caballus* (30243).

MELBOURNE BOTANICAL GARDENS (Melbourne, Australia), through William R. Guilfoyle: Thirty specimens of seeds and a pamphlet. 30009.

MELLICHAMP, J. A. (Bluffton, S. C.): Two specimens of androgynous clusters of *Pinus heterophylla*. 29611.

MERRIAM, Dr. C. HART (Department of Agriculture): "Medicine necklace" belonging to Bull Shield, a Blackfeet medicine man (30472); 7 specimens and a larva of *Proculus goryi*, Melly, from Guatemala (30592). (See under Agriculture, Department of.)

MERRILL, GEORGE P. (U. S. National Museum): Specimen of granite showing faulting, from Ellicott City, Md., (collected for the Museum) (29538); hackle, paring machine, and a masticator (gift) (29737); specimens of feldspar and kaolin (collected for the Museum) (30765).

MERRILL, H. C. (Auburn, Me.): Frame for weaving belts. 30025.

MERRILL, Dr. J. C., U. S. A. (Fort Sherman, Idaho): Collection of birds' eggs and nests, and skin of Hammond's Flycatcher, *Empidonax hammondi*. 29746.

MERWIN, Mrs. CHARLES (Washington, D. C.): Herbarium specimen of *Antirrhinum majus*, L. 29563.

METCALFE, WILLIAM. (See under Agriculture, Department of.)

MILLER, CHARLES, Jr. (Grand Rapids, Mich.): Arrowheads and potsherds. 30330.

MILLER, G. S., Jr. (Department of Agriculture): Four frogs from Maryland and a salamander from Rock Creek Park, District of Columbia. 30626. (See under Agriculture, Department of.)

MILLS, ROBERT A. (Chuluota, Fla.): Alcoholic specimens of miscellaneous insects, 2 alcoholic reptiles, a mammal, and 2 specimens of parasitic worms consisting of *Fasciola magna*, and a tapeworm (30185); centipedes and insects, newly hatched alligator, contents of an alligator's stomach, and a snake (30493).

MINNESOTA, UNIVERSITY OF. (See under Agriculture, Department of.)

MITCHELL, Hon. J. D. (Victoria, Tex.): Three species of land shells (29549); 8 specimens of unios (29656); 2 species of unios from Texas (29848); 3 specimens of *Callinectes hastatus* (29884); 3 specimens of *Purpura* and 1 of *Scala mitchellii*, Dall, from Matagorda Island, coast of Texas (30204); land and marine shells (30471); 3 species of *Succinea* and 1 species of *Cypris* (30649); 3 species of fresh-water shells (30809).

MOHR, Dr. CHARLES. (See under Agriculture, Department of.)

MONCLAR, M. le Marquis de (French legation, Caracas, Venezuela), through Prof. O. T. Mason: Nine photographs illustrating stone and terra cotta antiquities from Mexico and Venezuela. 30189.

MONTGOMERY, ROBERT (Warrior, Ala.): Specimen of selenite in coal. 30236.

MOONEY, JAMES. (See under Agriculture, Department of.)

MOORE, Miss ANNIE (Louisville, Ky.): Specimens of *Stuartia pentagyna*, L'Her., *Silene stellata*, Ait, *Chelone lyoni*, Pursh., *Chelone glabra*, L., *Viola pedata*, L., and *Polygala fastigiata*, Nutt. 29893.

MOORE, Mrs. A. T. (National Museum): Herbarium specimen of *Zamia integrifolia* from Florida. 29575.

MOORE, Miss HETTIE A. (Pasadena, Cal.): Specimen of *Semele rupium*, Sowb. 30666.

MOORE, P. A. (New Castle, Colo.): Fourteen arrow-points and 6 worked flakes of flint and obsidian. 30166.

MOOREHEAD, WARREN K. (Columbus, Ohio): Archæological objects. Deposit. 30487.

MORENO, Dr. F. P. (See under La Plata Museum.)

MORLOCK, HENRY (Fostoria, Ohio): Turtle shell and 2 fossils from northern Ohio. 30347.

MORSE, Prof. A. T. (Wellesley College, Wellesley, Mass.): Three specimens of *Spharagemon saxatile*, Morse. 29799.

MORSE, EDWARD L. (Duxbury, Mass.): Eight decorations and a gold snuff-box. 30763.

MORSE, Rev. P. H. (Goshen, Ind.): Two pairs of wooden sandals or clogs and 2 pairs of leather sandals worn in the rice fields by the natives of Assam, India. 30544.

MOSS, WILLIAM (Ashton-under-Lyne, England): Thirteen micro-photographs of radulæ of mollusks. 30727.

MOYER, L. R. (See under Agriculture, Department of.)

MUNSON, T. V. (See under Agriculture, Department of.)

MUSE, Mrs. EVA SCOTT (Hélouan, Egypt), through Dr. G. Brown Goode: Specimens of *Heliocopris gigas*, *Scarabæus sacer*, *Belostoma niloticum*, and *Deilephila lineata*. 30333.

MUSEUM OF COMPARATIVE ZOOLOGY (Cambridge, Mass.), transmitted by Dr. Walter Faxon: Three specimens of *Callinectes donæ* from Rio, 1 specimen of *Callinectes tumidus* from Victoria, and 1 specimen of *Callinectes sapidus acutidens* from Santa Cruz, Brazil. Exchange. 30723.

NASH, G. V. (See under Agriculture, Department of.)

NATIONAL SOCIETY OF THE DAUGHTERS OF THE AMERICAN REVOLUTION, transmitted by Mesdames Field, Lindsay, and Foote, Revolutionary Relics Committee: Silver ink-tray brought to America in 1676 by J. Frye and supposed to be of early Saxon make; leather wallet of Maj. Ebenezer Frye; Presidential campaign badge of General Washington; 3 Lafayette medals in bronze, silver spoon made from knee-buckles worn by Bvt. Col. Ephraim Sawyer, of Lancaster, Mass.; badge of the Daughters of the American Revolution; souvenir gold spoon of the Daughters of the American Revolution, and publications of the society. 30799.

NEALLEY, G. C. (Corpus Christi, Tex.): Herbarium specimens. 29705. (See under Agriculture, Department of.)

NEEDHAM, JAMES G. (Galesburg, Ill.): Specimens illustrating an article on "Studies in Life Histories of Common Dragon flies." 30265.

NEEFE, A. M. (Sweden, Pa.): Specimen of *Magnolia acuminata*, L. 29871.

NELSON, AVEN. (See under Agriculture, Department of.)

NELSON, E. W. (Chiapas, Tonala, Mexico): Four hundred specimens of Mexican plants (29670); 300 Mexican plants (29877); 600 Mexican plants (30532). Purchase. (See under Agriculture, Department of, and Mrs. N. M. Brown.)

NELSON, S. J. (See under Agriculture, Department of.)

NEWBERRY, C. E. (Puget Sound Academy, Coupeville, Wash.): Specimen of *Chiorœa leonina*, Gould. 30790.

NEW BRUNSWICK, NATURAL HISTORY SOCIETY OF (St. John, New Brunswick): Photographs of Abraham Gesner and Moses H. Perley (gift) (30511); archæological objects from Charlotte and Queen counties, New Brunswick, and Homosassa, Fla. (30651).

NEWCOMBE, Dr. C. F. (Provincial Museum, Victoria, British Columbia): Three species of marine shells from Queen Charlotte Islands (30440); 8 specimens of marine shells from British Columbia. (30568).

NEWLON, Dr. W. S. (Oswego, Kans.): Skull of a bear. 30156.

NEW YORK STATE MUSEUM (Albany, N. Y.): A. A. Gould's type specimens of Unionidæ. Loan. 29753.

NIBLACK, Lieut. A. P., U. S. N. (Navy Department): Helmet, iron sleeves, and 4 halberds mounted on a tablet. Deposit. 30685.

NICHOLSON, Prof. H. ALLEYNE (Aberdeen, Scotland): One hundred and sixty-five English graptolites, representing 22 genera and 54 species. Exchange. 30097.

NICKLIN, J. B. (Chattanooga, Tenn.): Pieces of brass from a mound near Chattanooga. 30087.

NOAH, G. V. (See under Agriculture, Department of.)

NORTHROP, G. J. (Marquette, Mich.): Specimen of moth, *Deilephila lineata*, Fab. 29897.

NORTON, ARTHUR H. (Westbrook, Me.): Five birds' skins. Exchange. 29866.

NOYES, ISAAC P. (Army Medical Museum, Washington, D. C.): Hammer-stone from Fairfax County, Va. 30716.

OAKES, Miss HELENA E. (See under High School Museum, Saginaw.)

OBERHOLSER, H. C. (Department of Agriculture): Herbarium specimen of *Lilium grayi*. 29780. (See under Agriculture, Department of.)

OFFUTT, HENRY T. (Washington, D. C.): Specimen of *Scalops aquaticus*. 29951.

OLDROYD, Mrs. T. S. (Los Angeles, Cal.): Marine shells from San Pedro Bay. 30483.

OLDS, HENRY W. (Woodside, Md.): Herbarium specimens. (29729, 29878.) (See under Agriculture, Department of.)

ORCUTT, CHARLES R. (Orcutt, Cal.): Reptiles; specimen of Pocket Rat, *Thomo-*

ORCUTT, CHARLES R.—Continued.
mys bottae, specimens of *Gelasimus gracilis;* 41 species of insects, and a specimen of German Carp, *Cyprinus carpio.* 30052.

OSTERHOUT, GEORGE E. (New Windsor, Colo.): Specimen of *Cypripedium fasciculatum,* (29901); specimen of *Carex magellanica* (30791). (See under Agriculture, Department of, and J. N. Rose.)

OWEN, Miss MARY A. (St. Joseph, Mo.): Two archæological objects from a mound near Maysville, De Kalb County, Mo. Deposit. 29899.

PALESTINE EXPLORATION FUND (London, England): Thirty-seven photographs, illustrating biblical antiquities. (*A.*) Purchase. 29586.

PALMER, EDWARD (Department of Agriculture): Two species of marine shells from Acapulco, Mexico. 29925.

PALMER, JOSEPH (U. S. National Museum): Specimen of Field Mouse, *Arvicola riparius.* 29666.

PALMER, Dr. T. S. (See under F. F. Crevecœur and S. M. Edwards.)

PALMER, WILLIAM (U. S. National Museum): Specimen of *Vesperugo carolinensis* (29665); 13 birds' skins from Florida (29693); specimen of Bat (*Vespertilio*) (29861); 26 mammal skins and 2 birds' skins from Florida (29854); crabs, coral, shells, bird, fishes, mammals, from Smiths Island, Virginia, collected for the National Museum (29873); 2 specimens of Wood Rabbit, *Lepus sylvaticus,* and a Gray Squirrel, *Sciurus carolinensis* (30177); one snake from Smiths Island, Virginia (30257); specimen of *Mus musculus* (30656); small collection of fishes from Lake Drummond, Dismal Swamp, Virginia; miocene fossils from near Suffolk; 5 toads, 2 bullfrogs, lizards, snakes, terrapins and a salamander, crayfish, land and fresh-water mollusks; and miscellaneous insects, mammal skins and skulls, and birds' skins from Dismal Swamp; 2 specimens of *Protonotaria citrea,* 1 specimen of *Sylvania mitrata,* embryos of *Lepus palustris,* 2 specimens of Swainson's Warbler, a tongue of a Turkey Buzzard, tongues of *Sitta carolinensis, Protonotaria citrea, and Sylvania mitrata* (30814).

PARSONS, Dr. W. B. (Missoula, Mont.): Specimen of *Charina plumbea.* 30394.

PASCOE, A. H. (Pass Christian, Miss.): Skull of Porpoise, *Tursiops tursio.* 30539.

PATTON, Dr. W. (Ammie, Ky.): Coal. 30152.

PAVLOW, Prof. A. (Moscow, Russia): Eighty-five specimens of Russian Cretaceous fossils, representing 36 species. Exchange. 29690.

PEACE RIVER PHOSPHATE COMPANY, transmitted by George W. Scott (Florida): Collection of fossil teeth and bones of mammals exhibited at the Atlanta Exposition. 30336.

PEARCE, RICHARD (Argo, Colo.): Uraninite. Purchase. 29959.

PEARSE, A. S. (Dewitt, Nebr.): Arrowhead from Maryland and a stone implement from Nebraska (29802); specimens of *Ostracoda* (29948).

PENNSYLVANIA SALT MANUFACTURING COMPANY (Natrona, Pa.): Specimens of cryolite. 29735.

PENNSYLVANIA, UNIVERSITY OF (Philadelphia, Pa.), transmitted by Mr. Stewart Culin: A large series of games and puzzles (29701); 6 mancala boards (29702). Deposit.

PENROSE, R. A. F., jr. (See under Interior Department, U. S. Geological Survey.)

PETTIGREW, F. W. (Sioux Falls, S. Dak.): Stone knife from Rosebud Reservation. 30233.

PETTIT, Dr. J. (Grimsby, Ontario, Canada): Specimen of *Lecanocrinus mæropetalus.* 30018.

PHELPS, GEORGE R. (Washington, D. C.): Archæological objects from Prince George County, Md. 30717.

PHILADELPHIA, CITY COUNCIL OF, transmitted by William Findlay Brown: Liberty bell medal and Council badge used on the occasion of the journey of the bell to the Atlanta Exposition. 29918.

PHILLIPS, BARNET (Brooklyn, N. Y.): Heavy dark-brown wool coat from Afghanistan. Exchange. 30449.

PHILLIPS, B. F. (Fremont, Pa.): Luna Silk moth. 30831.

PHYTOLOGIC MUSEUM (Melbourne, Australia), transmitted by Baron Ferd. von Müller: Two packages containing specimens of *Eucalyptus kino*. 30398.

PIPER, C. V. (See under Agriculture, Department of.)

PITTIER, H., Director, Instituto Fisico-geografico Nacional (San José de Costa Rica, Central America): Crustaceans from Golfo Dulce, Costa Rica. 30687.

PLUMB, J. NEALE (New York City): Three bone whistles from San Clemente Island, Cal. 30512.

PLUMB, L. H. (See under Agriculture, Department of.)

POLLARD, C. L., Department of Agriculture: Specimen of *Commelina sativa* (L.) Crantz (29576); 10 herbarium specimens (30184); 2 specimens of *Carex* from New Jersey (30355). (See under Agriculture, Department of.)

POLLARD, NORVAL (McKeesport, Pa.): Archæological objects from the Monongahela River gravel (exchange) (30345); 105 stone implements (gift) (30766); 125 rude chipped implements and other archæological objects found on the shores of the Monongahela River (gift) (30827).

POLLOCK, W. N. (See under Agriculture, Department of.)

PORTER, THOMAS C. (See under Agriculture, Department of.)

PRENTISS, Dr. D. W. (Washington, D. C.): Geological material from the Bermudas. 30782.

PRENTISS, D. W., jr. (See under Fish Commission, U. S.)

PRESTEL, F. A. C. (Frankfort-on-the-Main, Germany): Three engravings. Purchase. 30637.

PRIDEMORE, Gen. A. L. (Jonesville, Va.): Collection of human bones found in a cave near Duffield, Va. 29857.

PRILL, Dr. A. G. (Dosaville, Oreg.): Two skins of Cedar Waxwing, and 23 eggs of American Herring Gull from Isle Royal, Lake Superior. 30364.

PRINCETON COLLEGE (Princeton, N. J.), transmitted by J. B. Hatcher: Three fossil skulls, representing *Ischyromys typus*, *Leptauchenia major*, and *Eucrotophus bullatus*. 30404.

PRINGLE, C. G. (Charlotte, Vt.): Four hundred and twenty-five herbarium plants from Mexico (purchase) (30529); 6 specimens of Umbelliferæ collected in Mexico (gift) (30667); 220 Mexican plants (purchase) (30690).

PUMPELLY, R. (Newport R. I.), transmitted by J. E. Wolfe, University Museum, Cambridge, Mass.: Collection of thin sections of iron ores (30051); geological material collected during investigations relating to the Tenth Census (30329).

PURCELL, WILLIAM (Greenville, Miss.): Specimen of *Limenitis ursula*. 29776.

PURDY, JAMES B. (Plymouth, Mich.): Specimen of Henslow's Bunting, *Ammodramus henslowi*. 30409.

QUICK, RICHARD. (See under Horniman Museum.)

RACY, S. M. (See under Agriculture, Department of.)

RAIDER AND SHRIVER (Cumberland, Md.): Specimen of *Nautilus magister* from the Hamilton formation. 30073.

RALSTON BROTHERS (Chicago, Ill.): Two specimens of Tarantula, *Mygale hentzii*. Presented to the National Zoological Park and transferred to the National Museum. 29789.

RALPH, Dr. WILLIAM L. (Utica, N. Y.): Skins of *Dendroica occidentalis* and *Vireo solitarius cassini* from California (30161); through Major Bendire, specimen of Philip Island Parrot, *Nestor productus*[1] (30381); 3 specimens of Golden-cheeked Warbler from Texas (30741); an interesting and valuable collection of birds' eggs and nests, consisting of 911 eggs, representing 206 species and 222 sets, also 88 nests (30746);[2] 4 birds' skins from Florida (30758). Presented to the Smithsonian Institution and deposited in the National Museum.

RAMBO, M. ELMER (Philadelphia, Pa.): Specimen of Summer Warbler, *Dendroica æstiva*, specimen of Lazuli Bunting, *Passerina amœna*, and a pair of specimens of Bullock's Oriole, *Icterus bullocki*, from California. 29819.

RAMIREZ, Señor José (Instituto Medico Nacional, Mexico, Mexico): Thirty-four herbarium specimens. 30658.

[1] An extinct and very rare bird.

[2] A very valuable collection.

RANDALL, F. A. (Warren, Pa.): Chemung and Waverly formation fossils. Exchange. 30490.

RANDOLPH, P. B. (Seattle, Wash.): Shells and insects (29541, 29720, 29966, 30580, 30654).

RANSOME, F. L., transmitted by H. W. Turner, United States Geological Survey: Two specimens of lawsonite. 30092.

REED, HENRY A. (New York City), through George C. Maynard: Galvanometer used in testing telegraph lines in 1855, brought from London by Prof. S. F. B. Morse. Lent. 29700.

REMICK, A. B. (Taylorsville, Cal.): Specimen of epidote. 29594.

REVERCHON, J. (See under Agriculture, Department of.)

RHOADS, S. J. (See under Agriculture, Department of.)

RICE, B. W. (Oasis, Utah): Three specimens of *Ptychoparia kingi*. 30599.

RICHARDSON, FRED. (Jamestown, Colo.): Specimen of Silk moth, *Attacus columbia*, Sm. and Abb. 29535.

RICHMOND, C. W., U. S. National Museum: Reptiles, plants, 3 skeletons of a Black Skimmer, birds' eggs, specimens of *Trachynotus carolinus*, *Menidia*, *Cyprinodon variegatus*, and *Fundulus heteroclitus*, mammals, marine invertebrates, specimen of Rhinoceros Beetle, *Dynastes tityus*, and a small collection of birds' skins, from Smiths Island, Va (29648); 25 birds' skins, representing 5 species, from Nicaragua (29788); snake (30306); reptiles and batrachians from Smiths Island (30312).

RICKSECKER, A. E. (See under Agriculture, Department of.)

RIDGWAY, ROBERT, U. S. National Museum: Alcoholic mammals, reptiles, mammals (30481); 148 birds' skins from Florida (30509); 42 birds' skins from various localities (30510); reptiles and a specimen of Gar Pike, *Lepidosteus osseus*, from Vincennes, Ind. (30526).

RILEY, J. H. (Falls Church, Va.): Nest and 3 eggs of Grasshopper Sparrow, *Ammodramus savannarum passerinus*. 30731.

ROBERTS, Mrs. PERCY (New Orleans, La.): Specimen of *Cyathus striatus*. 29820.

ROBERTSON, E. LORING (Fillmore, Utah): Horn spoon found in an ancient cliff dwelling in the Grand Canyon of the Colorado River, Arizona. (Presented to the Smithsonian Institution and transferred to the National Museum.) 29595.

ROBINETTE, G. W. (Flag Pond, Va.): Shells from Virginia (30715, 30772).

ROBINSON, H. T. (See under Smithsonian Institution, Bureau of Ethnology.)

ROBINSON, Lieut. WIRT, U. S. A. (Hubbard Park, Cambridge, Mass.): Crustaceans, ophiurans and echinoderms, insects, birds, mollusks, mammals, reptiles (29679); 7 species of land shells from the West Indies (29758); 25 birds' eggs, representing 7 species, also 3 nests from Venezuela, South America, and a bird's nest from the West Indies (new to the Museum collection), 2 specimens of insects from Venezuela (29803); collection of birds' eggs from Virginia (29913); 139 birds' skins, including types of 11 new species from Margarita Island and the adjacent mainland of Venezuela, also 21 birds' skins from Bogota (30148); 16 birds' skins, principally ducks, from various localities (30194);[1] 11 mammal skins (30203).

ROCKHILL, Hon. W. W., Assistant Secretary of State (Washington, D. C.): A small bird-shaped earthenware whistle (29808); letter written in the Tibetan language (29892); Korean tobacco-pouch (30022); letter written in the Tibetan language (30613); ethnological objects from Korea, collected by Dr. H. N. Allen (30677).[2]

ROOKWOOD POTTERY COMPANY (Cincinnati, Ohio), transmitted by W. W. Taylor, president: Five specimens of pottery and 5 glass jars containing raw material used in making pottery. Deposit. 30586.

ROMEYN, Captain HENRY, U. S. A. (Fort McPherson, Ga.): Two specimens of *Allorhina nitida*. 29562.

ROPER, E. W. (Dublin, N. H.): Three hundred and fifty-five specimens of land and fresh-water shells from Jamaica (29668); 2 species of land and marine shells (29896).

[1] Purchase.

[2] Exchange.

ROSE, J. N. (Department of Agriculture): Seven herbarium specimens from New Windsor, Cal. (29590); 5 specimens of plants from Colorado collected by G. E. Osterhout (29662); herbarium specimen of *Acroclinium roseum* from Mr. Walter Deane, Cambridge, Mass. (29869); herbarium specimen of *Tridax dubia* from Mexico, sent by M. L. Fernald, Gray Herbarium, Cambridge, Mass. (29870); herbarium specimen of *Mentha aquatica* from F. D. Kelsey, Oberlin, Ohio (29895); 5 specimens of *Sanicula* from the eastern section of the U. S. (30070). (See under Agriculture, Department of.)

ROWLES, W. W. (See under Agriculture, Department of.)

ROYAL BIOLOGICAL STATION (Helgoland, Germany), transmitted by Dr. Ehrenbaum: Crustaceans representing 46 species. 29938.

ROYAL BOTANIC GARDENS (Kew, England), transmitted by Dr. W. T. Thiselton-Dyer, Director: Two hundred and fifty specimens of Umbelliferæ. Exchange. 30384.

ROYAL MUSEUM (Berlin, Germany), transmitted by Dr. Schöne, Director-General: Thirty-eight plaster casts of Hittite antiquities. (*A.*) Purchase. 29644.

RUBIN, CHARLES A. (Washington, D. C.): Collection of miscellaneous insects. 29761.

SAGE, J. N. (Portland, Conn.): Nest and 4 eggs of Brewster's Warbler, *Helminthophila leucobronchialis*. 30064.

SALMON, Dr. D. E. (See under Agriculture, Department of.)

SAMSON, A. A. (West Medford, Mass.), transmitted by Miss Clara W. Samson: Four old-style pit-saws. Exchange. 30393.

SAMSON, Miss CLARA W. (West Medford, Mass.): Three photographs of a winnowing fan used during colonial times. 30625. (See under A. A. Samson.)

SAVAGE, M. F. (New York City): Roman and Phœnician lamps, and Japanese fire-syringe (purchase) (29821); delft grease-lamp (exchange) (30545); tinder pistol used during colonial times (exchange) (30546); Ceylonese jingle used as a ceremonial spear, single-head drum from the Island of Gilolo; Ho-pe, a Sumatran three-joint trombone (exchange) (30547).

SAWYER, Mrs. SARAH (Wilmore, Ky.): Stalk of black Gorgonian coral from Palm Beach, Fla. 30429.

SCHATTENBERG, G. A. (See under Agriculture, Department of.)

SCHAEFFLER, JOHN B. (Chicago, Ill.): Two fossil medusæ from Eichstatt, Germany. Purchase. 30117.

SCHLÜTER, Dr. WILHELM (Halle, Germany): Specimen of *Cynomycterus ægyptiaca*, specimen of *Hyrax syriacus*, and a specimen of *Capra beden sinaitica*. (*A.*) Purchase. 29605.

SCHMID, F. S. (Washington, D. C.): Pekin Duck, in the flesh. 30376.

SCHNECK, Dr. J. (Mount Carmel, Ill.): Great Horned Owl, *Bubo virginianus*, in the flesh. 30349.

SCHÖNE, Mr. (See under Royal Museum, Berlin, Germany.)

SCHOTT, Mrs. AUGUSTA (Washington, D. C.): Autograph letters of George Engelman, John Torrey, and Herbert G. Torrey. 30525.

SCHUCHERT, CHARLES (U. S. National Museum): Three thousand and eighty-six specimens of Corniferous fossils (30030); 12,084 specimens of Hamilton fossils (30038); 469 specimens of Oriskany fossils (30039); 456 specimens of Clinton and Niagara fossils (30040). Collected for the Museum.

SCHUYLER, E. O. (New York City): Three wood carvings obtained from the Alaskan Indians (gift) (30492); 2 baskets from Perak (exchange) (30624); ethnological objects, Mexican textiles, and a musical instrument (exchange) (30801).

SCHWARZ, E. A. (Department of Agriculture): Turtle shell from San Diego, Tex. (30328); 10 specimens of Odonata from Salt Lake, Utah (30527). (See under Agriculture, Department of).

SCHWEINBURG, FRAULEIN VICTORIA (Berlin, Germany), transmitted by Mr. S. P. Langley: Two counting-out rhymes. 29891.

SCIDMORE, Miss E. R. (Washington, D. C.): Thirty-five photographs illustrating the manners and customs of Java, also ethnological objects (gift) (30262); 26 photographs illustrating scenes of Buddhism in Java (gift) (30271); collection of pottery, lacquer, jade, and

SCIDMORE, Miss E. R.—Continued.
other objects (deposit) (30540); pencil outline of a foot of a Tamil (gift) (30585).

SCOLLICK, J. W. (U. S. National Museum): Lizard. 30305.

SCOTT, G. W. (See under Peace River Phosphate Company.)

SCOTT, Lieut. J. H., U. S. Revenue-Marine cutter *Forward* (Mobile, Ala.): Specimen of Hawk Moth, *Enyo lugubris*. 29924.

SCRIBNER, Prof. F. Lamson. (See under Agriculture, Department of.)

SCUDDER, Dr. S. H. (Cambridge, Mass.): Forty-four specimens of *Melanopli*, representing 21 species, and including types of 17 species. Exchange. 30303.

SEDORE, JACOB (Eldon, Iowa,) transmitted by G. W. Devins: Jaw of a mammoth. 30604.

SEFTON, IRA H. (Gold Run, Cal.): Specimen of *Cucujus puniceus*, Mannerheim. 30401.

SHARP, Dr. DAVID. (See under British West India Committee.)

SHAW, Lieut. H. P., U. S. N. (retired) (Alberene, Va.): Specimens of a plant supposed to be an antidote for the bite of a snake, called "The Master Poison." 29800.

SHELDON, Prof. C. S. (Oswego Normal School, Oswego, N. Y.): Miscellaneous insects. 30098. (See under Agriculture, Department of.)

SHELLEY, D. H. (Moscow, Ohio): Archæological objects from Ohio and Kentucky. 29682.

SHEPPARD, Lieutenant, U. S. N., and Hon. H. S. WISE: Star-dial compass in a gilt case, ornamented and inscribed with astrological characters. 29863.

SHERWOOD, W. L. (New York City): Two specimens of *Proteus* from Europe. 30724.

SHIPLEY, E. E. (Cincinnati, Ohio): Ten photographs. 29961.

SHOVE, D. P. (Fall River, Mass.): Buff Wyandotte fowl (30378); Houdan fowl (30485).

SHUFELDT, Dr. R. W. (Takoma, D. C.): Specimen of spider (*Dolomedes tenebrosus*, Hentz), with cocoon (29653); 3

SHUFELDT, Dr. R. W.—Continued.
specimens of birds' skins from California (29867). (See under H. B. Kalding.)

SIGERFOOS, C. P. (See under Dr. W. K. Brooks.)

SIMS, E. B. (Gainesville, Tex.): Fossil bone and quartz crystal. 29651.

SIMMS, WILLIS (Buck Hill, Ga.): Spur of a game chicken. (Presented to the Smithsonian Institution and transferred to the National Museum.) 30573.

SIMPSON, Dr. J. C. (Washington, D. C.): Specimen of Walking-stick, *Diapheromera femorata*, Say. 29804.

SINGLEY, Prof. J. A. (Giddings, Tex.): Ten species of shells from Guaymas, Mexico (29681); Miocene and other fossils from the Galveston deep well (30165, 30202); 10 species of mollusks (30484).

SKINNER, Dr. HENRY (Academy of Natural Sciences, Philadelphia, Pa.): Four species of Diurnal moths (30205); transmitted by L. O. Howard, 14 specimens of Diurnal moths, representing 11 species (30632). Exchange.

SMITH, E. (Hoboken, N. J.): Reptiles from Europe. 30231.

SMITH, Hon. HENRY C. (See under G. G. Berger.)

SMITH, Dr. HUGH M. (U. S. Fish Commission): Two toads from Lemon City, Fla. 30521.

SMITH, Prof. J. B. (New Brunswick, N. J.: Twenty-three specimens of Noctuidæ, representing 17 species, including types of 15 species (30410); specimen of *Sphærularia bombi*, Dufour, 1836 (29932).

SMITH, J. D. (See under Agriculture, Department of.)

SMITH, Dr. M. C. (Lynn, Mass.): Minerals (30235); Upper Carboniferous fossils from Windsor, Nova Scotia (30277); minerals from Wentworth Quarry, Hants County, Nova Scotia (30368).

SMITH, THOMAS B. (Rose Creek, Minn.): Archæological objects. Deposit. 30042.

SMITHSONIAN INSTITUTION,[1] Mr. S. P. Langley, Secretary. Hexagonal clock with 3 dials (29616); iron clock dial (29617); Japanese clock (29618); hourglass (29619); 3 sand-glasses (29634);

[1] Other accessions received by the Smithsonian Institution and deposited in the National Museum are referred to under the names of the senders.

SMITHSONIAN INSTITUTION—Continued.

pocket dial with compass (29794); 2 sand-glasses, modern three-minute egg-glasses in black walnut frames (29862); 12 pieces of electrical apparatus supposed to have been used by Professor Henry in his laboratory work at the Smithsonian Institution, and 16 photographs of Professor Henry's early electrical apparatus, prepared under the direction of Miss Henry and exhibited at the World's Columbian Exposition, Chicago, 1893 (29868). Deposited in the National Museum.

TRANSMITTED FROM THE BUREAU OF ETHNOLOGY, Major J. W. Powell, Director:

Ethnological objects obtained from the Alaskan Indians, Chilkat River (29664); collection of antiquities obtained from the cliff dwellings and from ancient pueblos, near Tusayan, Ariz., collected by Dr. J. Walter Fewkes (29889); small collection of potsherds, collected by F. W. Hodge from the Zuñi ruins of Kechipauan, Hawikuk, and K'iakima, and from the prehistoric ruin of Katzimo, in western New Mexico (29990); specimen of Scorpion, *Vejovis punctipalpis*, Wood, from Seriland, western Sonora, collected by Mr W J McGee (30225); arrowheads and potsherds from near Grand Rapids, Mich., sent by Charles Miller, jr. (30330); ethnological objects obtained from the Kiowa Indians (30341); Indian compass constructed after the manner of those in use among the aborigines in Florida (30497); necklace of human teeth, presented by King Timbenuku, ruler of six of the atolls of the Gilbert Island group, to Lieut. F. L. Clarke, U. S. A. (30498); clay pipe and a jaw bone found in a supposed Indian grave, in Deerfield Township, Lenawee County, Mich. (30517); ethnological objects obtained from the Seri Indians, Sonoro, Mexico (30579); model of a ghost-shirt belonging to a Dakota Indian, obtained by H. T. Robinson, Leslie, S. Dak. (30646).

TRANSMITTED FROM THE NATIONAL ZOOLOGICAL PARK, Dr. Frank Baker, superintendent:

Golden Eagle, *Aquila chrysætos*, and Western Porcupine, *Erethizon d. epixanthus*, in the flesh (29583); 2 Virginia Deer, *Cariacus virginianus*, young Virginia Deer, *Cariacus virginianus* x *macrotis*, Raccoon, *Procyon lotor*, and a Canada Porcupine, *Erethizon dorsatus*, in the flesh (29584); Macaw, *Ara aracouya*, in the flesh (29585); Wolverine, *Gulo luscus*, and a Red Fox, *Vulpes fulvus*, in the flesh (29626); specimen of Golden Eagle, *Aquila chrysætos* and Bald Eagle, *Haliætus leucocephalus* (29627); 2 specimens of Wart Hog, *Phacochœrus æthiopicus*, and an Armadillo, *Tatusia novemcincta*, in the flesh (29676); Diamond-backed Rattlesnake, *Crotalus adamanteus* (29777); Elk, *Cervus canadensis* (29874); Lion, *Felis leo*, in the flesh (29905); Fox, *Vulpes fulvus*, in the flesh (29906); Porcupine, *Erethizon dorsatus*, in the flesh (29952); Beaver, *Castor fiber*, in the flesh (29953); Squirrel, *Sciurus* sp., in the flesh (29954); Kangaroo (29974); Porcupine, *Erethizon dorsatus*, in the flesh (29978); Sea Lion and Elk (29991); Porcupine, *Erethizon dorsatus*, in the flesh (29999); alcoholic specimen of Armadillo, *Tatusia novemcincta* (30034); Sea Lion, *Zalophus californicus*, in the flesh (30036); Porcupine, *Erethizon dorsatus*, from New Hampshire, in the flesh (30048); Golden Eagle, *Aquila chrysætos*, in the flesh (30163); Elk, *Cervus canadensis*, in the flesh (30178); 3 specimens of Monkeys, comprising *Cercopithecus diana*, *Macacus cynomolgus*, and *Cebus* (30179); Felis leo, *Nasua narica*, and specimen of *Gazella dorcas* (30223); Alligator, Rattlesnake, and 3 Magpies (30245); Polar Bear and Beaver (30314); Monkey, *Macacus rhesus*, and Kangaroo, *Macropus* (30414); Rattlesnake (*Crotalus*), King Snake (*Ophibolus*), Bull Snake (*Pityophis*), and a Magpie, *Pica pica hudsonia*, in the flesh (30419); Macaw, *Ara macao*, Macaw, *Ara chloroptera*, Clarke's Crow, *Nucifraga columbiana*, young Ostrich, *Struthio camellus* (30437); 2 specimens of Peccary, *Dicotyles tajacu*, and a Beaver, *Castor canadensis*, in the flesh (30439); Swan, in the flesh (30442); Monkeys, *Maca-*

SMITHSONIAN INSTITUTION—Continued.
TRANSMITTED FROM THE NATIONAL ZOOLOGICAL PARK—Continued.
cus rhesus, and Lynx, *Lynx rufus maculatus*, in the flesh (30448); Lion, *Felis leo*, Buffalo, *Bison americanus*, and still-born Buffalo (30524); Puma, *Felis concolor*, and Sooty Mangabey, *Cercocebus fuliginosus*, in the flesh (30543); 2 specimens of Puma, *Felis concolor*, 2 specimens of *Macacus rhesus*, 2 specimens of *Canis lupus griseo-albus*, and a Black Bear, *Ursus americanus* (30596); 2 specimens of *Macacus rhesus* in the flesh (30673); specimen of Clark's Nutcracker, *Nucifraga columbiana*, in the flesh (30691); specimen of *Ateles ater* (30768); young Ostrich, in the flesh (30771).

SMOLINSKI, JOSEPH (Washington, D. C.): Polish coin and a Confederate note of the issue of 1864. 30770.

SNYDER, Dr. JOHN J. (New Oxford, Pa.): Twelve arrowheads from Two Taverns. 30012.

SONNE, C. F. (See under Agriculture, Department of.)

SÖRENSEN, Rev. P. H. (Jakobshavn, North Greenland): Collection of natural history specimens. 30044.

SORIA y MATA, Señor ARTURO (Madrid, Spain.) Transmitted by Señor Arturo Baldasano: Cardboard model of geometrical figure giving a practical idea of the shape of the polyhedrical origin, as represented in a work on "Polyhedrical Origin of the Species." Presented to the Smithsonian Institution and transferred to the National Museum. 29981. (See under Smithsonian Institution.)

SOUHAMI, A. R. (New York City): Hanging lamp of Damascus manufacture. Purchase. 30084.

SOULÉ, Lieut. H. B., U. S. N. (London, England): Skin of Secretary Bird, *Gypogeranus serpentarius*, from the Transvaal, South Africa. 30127.

SPANOGLE, SAMUEL (Aurora, Nebr.): Mica from Wyoming and 4 arrow points from Nebraska. 30590.

SQUIER, JOHN N. (Spokane, Wash.): Specimen of steatite. 30067.

SQUYER, HOMER, (Wibaux, Mont.): Cretaceous fossils. 30499.

STAMPER, W. S. (See under Agriculture, Department of.)

STANDINGER and BANG HAAS (Blaseurts, Dresden, Germany): Thirty-eight specimens of insects mentioned in the Bible. (*A.*) Purchase. 29587.

STANDISH, B. H. (Minneapolis, Minn.): Specimens of *Camponotus pennsylvanicus* and *Lasius latipes*. 30733.

STANTON, T. W. (U. S. Geological Survey): Specimens of Unios, land and fresh-water shells from Texas. (29677, 29849.)

STARGARDTER, L. (Washington, D. C.): Spider (*Argiope riparia*, Hentz.). 29722.

STEARNS, Dr. FREDERICK (Detroit, Mich.): Thirteen Oriental seals. 30029.

STEERE, J. B. (Ann Arbor, Mich.): Two specimens of Trogon, *Pyrotrogon ardens*, from the Philippine Islands. Purchase. 29760.

STEINER, Dr. ROLAND (Grovetown, Ga.): Collection of archæological objects from Georgia. (29546, 29912, 30420.) Deposit.

STEJNEGER, Dr. LEONHARD (U. S. N. M.): Two specimens of Crab (*Telmessus cheiragonus*) from Kamchatka. 30089.

STEPHENS, F. (Witch Creek, Cal.): Type specimen of Burrowing Owl, *Speotyto cunicularia obscura*. 29741.

STEVENS, Mrs. A. F. (See under Agriculture, Department of.)

STEWART, Dr. T. B. (Lock Haven, Pa.): Rudely chipped stone implement and a photograph of a collection of Indian relics. (29865, 29963.)

STILES, CHARLES WARDELL (Department of Agriculture): Parasitic worms from the collection of Leidy and Stiles (deposit) (29934); original specimens of *Moniezia expansa* (type of *Tænia expansa*, R., 1810) and *Monostoma renicapite*, Leidy (gift) (29935); specimens of *Ctenotænia* (?) *variabilis*, Stiles, 1895; and *Davainea salmoni*, Stiles, 1895 (exchange) (29945).

STILL, E. G. (See under Agriculture, Department of.)

STILLWELL, L. W. (Deadwood, S. Dak.): Worked flint from Tennessee. 29818.

STORRS, JAMES (Tehama, Cal.): Skin and skull of Mole, *Scapanus townsendi*. Purchase. 29571.

STOSE, G. W. (Washington, D. C.), transmitted by T. W. Stanton: Thirty

STOSE, G. W.—Continued.
specimens of Upper Carboniferous fossils from Wolfville, Nova Scotia. Exchange. 29979.

STOSSICH, Prof. M. (Trieste, Austria): Parasites collected at Trieste and determined by Professor Stossich. Exchange. 29944.

STOVER, E. D. (See under Agriculture, Department of.)

STRAIT, Hon. T. J. (Member House of Representatives.) Transmitted by Mr. C. D. Walcott: Triassic sandstone from near Raleigh, N. C. 30710.

STÜRTZ, B. (Bonn-a-Rhein, Germany): Eight fossil starfishes from Bundenbach, Germany. 30628.

SUKSDORF, W. N. (See under Agriculture, Department of.)

SULZBERGER, D. (Philadelphia, Pa.): First Jewish prayer book published in America. Deposit. (Returned.) 29591.

SWAIN, JOHN & SON (London, England): Eighteen specimens of half-tone work, in black and in colors. 30636.

SWEENY, THOMAS (U. S. National Museum): Cream pitcher of wedgewood ware. 30258.

SWORD, J. F. (Jonesville, Va.): Fifteen species of Unios from Clinch River, Va. 30808.

TATE, W. B. (U. S. National Museum): Katydid, *Microcentrum retinerve*. 29825.

TAYLOR, Miss K. A. (Baltimore, Md.): Specimen of *Commelina communis*. 30197. (See under Agriculture, Department of.)

TAYLOR, W. W. (See under Rookwood Pottery Company.)

TENNESSEE, UNIVERSITY OF. (See under Agriculture, Department of.)

TENNEY, Miss HATTIE (Washington, D. C.): Mexican pottery from Argentine Republic. Deposit. 29900.

TEST, Dr. F. C. (Department of Agriculture): Snake and frog from Dismal Swamp, Virginia. 29560.

TEUTE, FERD. (Rochester, N. Y.): Fifty species of Lepidoptera. 30173.

THE BRUSSTAR SHIP BUILDING COMPANY (Baltimore, Md.), transmitted from the U. S. Fish Commission: Four models of boats. 29919.

THE CARBORUNDUM COMPANY: Carborundum, transmitted by E. G. Acheson, president, and Dr. David D. T. Day, of the U. S. Geological Survey. 30290.

THE DRAKE COMPANY (Sioux City, S. Dak.): Two slabs of agatized wood. Deposit. 30207.

THE TELEGRAPHIC HISTORICAL SOCIETY OF NORTH AMERICA: Oil portrait of S. F. B. Morse; set of photographs of S. F. B. Morse; photograph of J. H. Wade; photo-lithographic copy of a painting of the founders of the Baltimore & Ohio Railroad, transmitted by G. C. Maynard, secretary, Washington, D. C. (30578); framed specimen of Morse telegraph writing, recorded in the Baltimore office, of the first telegraph line in 1884 (30784). Deposit.

THISELTON-DYER, Dr. W. T. (See under Royal Botanic Garden, Kew, England.)

THOMPSON, C. H. (See under Agriculture, Department of.)

THOMPSON, GREELAND. (See under Miss Clara Hough.)

THOMPSON, Mrs. J. M. (Ocala, Fla.): Rude plaster casts of an old Spanish coin. 30552.

THOMSON, Mrs. J. S. R. (See under Agriculture, Department of.)

THOMSON, M. JULIUS. (See under S. M. Jorgensen.)

THORPE, Dr. H. H. (Liberty Hill, Tex.): Femur of mastodon. 30764.

THURBER, E. C. (Alhambra, Cal.): Three lizards. 30703.

THUROW, F. W. (See under Agriculture, Department of.)

TIFFANY, CHARLES L. (New York City), transmitted by George F. Kunz: Forty pieces of Tiffany favrile glass, made under the personal supervision of Mr. Louis C. Tiffany; also 2 metal stands. Deposit. 30543.

TIFFANY & CO. (New York City): Geological specimens (*A.*) (purchase) (29717); cut emerald from Muso mine, United States of Colombia (*A.*) (purchase) (29759); 6 pieces of Japanese cloisonné, enameled brass vase, 2 pipestems from Tunis, 2 samples of Russian lacquer, 37 pieces of iridescent glass, 25 miscellaneous specimens from Syria, 24 pieces of porcelain, faïence, and earthenware, an antique Greek earthenware dish, glass pitcher, and an an-

TIFFANY & CO.—Continued.
tique enameled bronze buckle (purchase) (29790); 2 Tartar knives and other ethnological objects (purchase) (29791).

TODD, BAXTER (Los Angeles, Cal.): Specimen of igneous rock, probably a basalt. (Returned.) 30412.

TOLLIN, OSCAR (Miakka, Fla.): Three specimens of Everglade Kite and 2 Warblers (gift) (29756); 7 specimens, representing 4 species of young birds from Florida (purchase) (29757).

TOMS, C. F. (Hendersonville, N. C.): Manganese ore from Green River (29708); specimen of rock underlying the Zircon mine on Green River (29713); gold ore from Boilston gold mines in Henderson County (29728); Auerlite (29757); ore from Reasonover Creek, N. C. (30125).

TOOMER, ISAAC (Westlake, La.): Specimen of *Dynastes tityus*. 30783.

TOPPING, D. LEROY. (See under Agriculture, Department of.)

TORREY, Mrs. M. C. C. (Baird, Miss.): Specimen of lignified banana and 4 fragments of pottery from near Lake Dawson. 30709.

TOWNSEND, CHARLES H. (See under Fish Commission, U. S., and Thomas Lee.)

TOWNSEND, C. H. TYLER. (See under Agriculture, Department of.)

TRACY, ANDREW (Greenville, Miss.), through H. St. L. Coppee: Carved stone pipe from Arkansas. 30643.

TRACY, S. M. (See under Agriculture, Department of.)

TRELEASE, WILLIAM (Missouri Botanical Garden, St. Louis, Mo.): Two specimens of Alcyonarian from Corvo, Azores. 29882.

TREMBLY, ROY (U. S. National Museum): Skin and skull of Brown Bat, *Adelonycterus fuscus*. 29771.

TREASURY DEPARTMENT, through Secretary of the Treasury and the Director of the Mint: Collection of National medals struck at the U. S. Mint, Philadelphia, forming a portion of the exhibit of the Treasury Department at the Atlanta Exposition (deposit) (30363).

TREASURY DEPARTMENT—Continued.
U. S. LIFE-SAVING SERVICE, transmitted by Capt. J. H. Long (Fenwicks Island, Del.): Skeleton of Finback Whale (30795).

TRISTÁN, SEÑOR J. FID. (See under Agriculture, Department of, and Costa Rica, National Museum of.)

TRUE, F. W. (U. S. National Museum): Five photographs of Laplanders (30115); specimen of Hickory-borer, *Chion zinctus*, Drury (30561). (See under Fish Commission, U. S.)

TUBB, CHARLES L. (Amory, Mass.), transmitted by the Bureau of Ethnology: Large skin jug. 30318.

TURNER, H. W. (U. S. Geological Survey): Geological specimens from Mexico (30103); native gold with secondary albite in veins in porphyry (30424). (See under F. L. Ransome.)

TURNER, Miss S. W. (Washington, D. C.): Two ancient Greek coins and an icon. 30380.

TURNER, W. H. (See under Agriculture, Department of.)

TURNER, Mrs. W. W. (no address given): Series of reductions of Assyrian reliefs. 30570.

TWEED, J. W. (Ripley, Ohio): Collection of stone implements. Exchange. 30133.

TWEEDY, FRANK. (See under Agriculture, Department of.)

UDDEN, Prof. J. A. (Augustine College, Rock Island, Ill.): Specimens of Stoneflies, *Nemoura albidipennis*, Walk. 29659.

VAN DENBURGH, J. (Stanford University, Cal.): Set of eggs of Arkansas Goldfinch, *Spinus psaltria*. 30699.

VAN DEUSEN, ROBERT T. (Stuyvesant, N. Y.): Stamped pitcher, and a pitcher decorated with a transfer pattern. Deposit. 30309.

VAN DIEN, Mrs. R. (See under Agriculture, Department of.)

VAN HASBROUCK, Mrs. E. J. (See under Agriculture, Department of.)

VAN MATER, J. A. (Franklin Furnace, N. J.): Seventy specimens of pink calcite. 29569.

VAN SICKLE, W. M. (See under Agriculture, Department of.)

VON LINSTOW, Dr. O. (Gottengen, Germany): Specimens of *Bothriocephalus quadratus*, von Linstow, 1892; *Tænia*

VON LINSTOW, Dr. O.—Continued.
puncta, von Linstow, 1872, and *Tænia friedbergeri*, von Linstow, 1878. Exchange. 29931.

VON MÜLLER, Baron Ferd. (Melbourne, Australia): Specimens of algæ (exchange) (30006); 102 specimens of acacia (gift) (30269); specimen of *Banksia grandiflora* (30456). (See under Agriculture, Department of, and Phytologic Museum.)

VON SCHMIDT, JARO (Tustin City, Cal.): Winter buds of *Potamogeton pectinatus*. 30275.

VASEY, Miss F. N. (Department of Agriculture): Two specimens of *Quercus stellata* (gift) (30188); 2 specimens of *Quercus macrocarpa* (deposit) (30230).

VERY, C. F. (New Albany, Ind.): Hybrid mullein. 30739.

VICKERS, E. W. (Ellsworth, Ohio): Specmens of Moles (30160); Shrew, *Blarina parva* (30216).

VIGNAL, L. (Paris, France): Collection of Miocene fossils from France. Exchange. 30101.

VINCENHELLER, L. (See under Arkansas Commission to Atlanta Exposition.)

VOGT, Dr. F. A. (Buffalo, N. Y.): Transmitted by John D. McChesney, U. S. Geological Survey: Three specimens of *Eurypterus*. 30704.

VORHIS, H. G. (Mt. Vernon, Mo.): Piece of a petrified tree. 30124.

WAGNER FREE INSTITUTE (Philadelphia, Pa.): Eight Mesozoic fishes from Europe. Exchange. 29699.

WABY, J. F. (Botanic Gardens, British Guiana): Seventy-six plants from the Island of Barbados. Presented to the Smithsonian Institution and deposited in the National Museum. 30263.

WALCOTT, Mr. CHARLES D. (Director, U. S. Geological Survey): Ten specimens illustrating the Lower Cambrian formation, collected by him in the White Mountain Range, Inyo County, Cal. (29578); 15 specimens of Corniferous limestone fossils from Berne, Albany County, N. Y. (30754). (See under Interior Department, U. S. Geological Survey; Prof. Rudolph Leuckart and Hon. T. J. Strait.)

WALCOTT, CHARLES D., Jr. (Washington, D. C.): Specimen of Lower Cambrian quartzite, containing *Scolithus linearis*,

WALCOTT, CHARLES D., Jr.—Continued.
from the excavation for the Cairo building, Washington, D. C. 29579.

WALKER, B. L. (Washington, D. C.): Skin of a snake from Alabama. 29631.

WALKER, BRYANT (Detroit, Mich.): Six species of Unionidae from Michigan. 30139.

WAPLE, J. E. (See under R. Pumpelly.)

WAR DEPARTMENT, Quartermaster-General's Office. (See under Laun.)

WARD'S NATURAL SCIENCE ESTABLISHMENT (Rochester, N. Y.): Skeleton of a man, showing muscular areas (*A.*) (purchase) (29550); specimen of Roe Deer (*A.*) (purchase) (29596); geological specimens (*A.*) (purchase) (29716); three mounted mammals (purchase) (29784); onyx from Pueblo, Mexico (purchase) (30094); specimen of *Nautilus macromphalus*, specimen of *Nautilus umbilicatus*, and specimen of *Turrilites* (purchase) (30131); two plaster casts of medusæ from the Solenhofen Slates, Germany (exchange) (30605).

WASHINGTON LOAN AND TRUST COMPANY. (See under Brownell, Frank. Bequest of.)

WATERS, C. E. (See under Agriculture, Department of.)

WAY, N. S. (Yorklyn, Del.): Scraper of yellow jasper with a rounded end. 30371.

WAYMAN, G. TURNER (Valencia, Venezuela): Collection of insects (exchange) (30344); specimen of *Lachesis mutus* (gift) (30700).

WAYNE, ARTHUR T. (Mount Pleasant, S. C.): Two birds. Exchange. 30832.

WEEKS, RICHARD (Washington, D. C.): Old style English coffee urn made of copper; 17th century. Purchase. 29657.

WEIR, PAUL (Owensboro, Ky.): Archæological objects. 30619.

WEIBEL, E. G. (Fort Huachuca, Ariz.): (See under Agriculture, Department of.)

WEBB, J. G. (Osprey, Fla.): Hawk moth. *Amphonyx antæus*, Drury. 29847.

WEBER, G. E. (Opelika, Ala.): Specimen of *Misumena vatia*, Clark. 29858.

WEED, WALTER H. (See under Interior Department, U. S. Geological Survey.)

WEIBER, E. G. (See under Agriculture, Department of.)

WELLESLEY COLLEGE. (See under Agriculture, Department of.)

WESLEY, WILLIAM, & SON (London, England): Ethiopic charm-roll, 17th century (purchase) (29606); the Gothic and Anglo-Saxon Gospels with the versions of Wyckliffe and Tyndale; Codex Vaticanus; King James Version 1613, Genoa Bible 1547; Codex Sinciticus (*A.*) (purchase) (29814); facsimiles of Coverdale's Bible and Tyndale's Bible (purchase) (29815).

WHARTON, JOSEPH (Philadelphia, Pa.): Sperrylite from Vermillion Mine, near Sudbury, Ontario. 30237.

WHEELER, C. F. (See under Agriculture, Department of.)

WHEELOCK, L. P. (Pittsburg, Pa.): Cranium of a fish from the Carboniferous limestone formation of Kelly's Island, Ohio. 30762.

WHITE, DAVID (U. S. Geological Survey): Specimen of fungus collected on Whitman Knob, Webster County, W. Va. (29840); ferns from Tennessee and West Virginia (29927); cone-in-cone from near Belva, W. Va. (30226). (See under Interior Department, U. S. Geological Survey.)

WHITEHORN, WORTH (Rochester, Nebr.): Fossil tooth of horse. 30824.

WIDMANN, O. (Old Orchard, Mo.): Nests of Short-billed Marsh Wren and Song Sparrow from St. Charles County, Md. 29769.

WILDER, Dr. HARRIS H. (Smith College, Northampton, Mass.): Three salamanders from New England. 30522.

WILKINSON, E. C. (Penn Yan, N. Y.): Oil painting of Shah-Coo-Pee, the orator of the Sioux Indians. Lent. 29638.

WILLIAMS, Rev. JOHN B. (Georgetown, S. C.): Cells of Leaf-cutting Bee (*Megachile* sp.). 30054.

WILLIAMSBURG SCIENTIFIC SOCIETY (Brooklyn, N. Y.): Ten specimens of miscellaneous shells, representing five species. Exchange. 30476.

WILSON, DAVIES (Washington, D. C.): Porphyritic gneiss from Winchendon, Mass. 30031.

WILSON, J. ORMOND (Washington, D. C.): Scorpion from Liberia. 30467.

WILSON, Miss SADIE RAY (Forest Glen, Md.): Two arrowheads of white quartz (30775); grooved ax (30816).

WILSON, THOMAS (U. S. National Museum): Archæological objects from Ohio (29612, 29630); archæological objects from Brittany, France (30134); skeleton of a cave bear from southern France (30618). (See under Guiseppe Bellucci.)

WING, E. T. (Pleasantdale, Me.): Devonian slab containing mollusks. 30577.

WISE, Hon. H. S., and Lieutenant SHEPPARD (U. S. N.): Star dial with compass in an ornamented gilt case, inscribed with astrological characters. 29863.

WOLTZ, GEORGE (U. S. National Museum): Rabbit in the flesh. 29711.

WOOD, J. MEDLEY. (See under Agriculture, Department of.)

WOOLMAN, A. J. (Duluth, Minn.): Small collection of fresh-water fishes from Mexico. 29565.

WOOSTER, A. F. (Norfolk, Conn.): Pupa of Hawk moth, *Protoparce carolina*, L. 29806.

WORTHEN, CHARLES K. (Warsaw, Ill.): Fifty-six skins and skulls of moles and shrews from British Columbia. Purchase. 29628.

WORTHINGTON, J. (Mannington, W. Va.): Oil sand from Marion County. 29613.

WRIGHT, BERLIN H. (Penn Yan, N. Y.): Three species of Unios (30279); 5 specimens of Unios from Longwood, Fla. (30464); specimen of *Stigmaria ficoides* (30503).

WURZLOW, H. (See under Agriculture, Department of.)

YALE, CHARLES, (Louisiana, Mo.): Stylobite from beds of Burlington limestone. Purchase. 29917.

YOUNG NATURALISTS' SOCIETY (Seattle, Wash.) transmitted by H. H. Hindshaw: Three crabs from Puget Sound (29582); 9 species of shells from Puget Sound and San José de Guatemala (30428); 6 marine shells and other specimens from Puget Sound (30756); specimens of *Astarte* from Port Orchard, Wash. (30767).

ZURICH BOTANICAL GARDEN. (See under Agriculture, Department of.)

ZABRISKIE, Rev. J. L. (See under Agriculture, Department of.)

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Pennsylvania Salt Manufacturing Co	29735
Ransome, F. L	30092
Remick, A. B	29594
Sims, E. B	29651
Smith, Dr. M. C	30235, 30368
Smithsonian Institution	30317, 30362, 30664
Spanogle, Samuel	30590
The Drake Company, Sioux City	30207
Tiffany & Company	29759
Toms, C. F	29767
Van Mater, J. A	29569
Wharton, J	30237
Williamsburg Scientific Society	30476

DEPARTMENT XIII.

GEOLOGY.

	Accession number.
Applegate, J. W. M	30644
Azeez, Miss A. A	30209
Babbitt Brothers	30408
Bendire, Maj. Charles, U. S. Army	29747
Blake, W. P	30382
Carter, John T	29647
Crawford, J. J	29557
Crosby, F. W	29719, 30010
Crosby, F. W. & W. O	30556
Cross, F. J	30159
Damon, R. F	30208
Day, Dr. D. T	30234, 30460
Durden, Henry S	29785, 29852, 29914, 29955, 30190
Earseman, W. A	29601
Edgemont Stone Company	30726
English, George L., & Company	29715
Field Columbian Museum	29602
Fish Commission, U. S	30147
Fleming, William	29633
Foote, Dr. A. E	29714
Foster, George	30612
Fuller, W. H	29614, 30253
Guthrie, Ossian	30307
Hague, A	30515
Heckman, J. C	30447
Heighway, A. E	29712, 30738
Heymann, S	29540
Hine, T. W	29686
Horniman Museum	29853
Howell, E. E	29718, 29779
Hughes, H. F	30339
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Johnson, J. F	29556
Kemp, J. F	30597
Krauss, Alfred	29958, 30465

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Kunz, G. F	29792
La Plata, Museo de	30571
Langley, Hon. S. P	29995
Lemke, Miss Elizabeth	30343
Long, S., & Son	29588
Lowe, Dr. J. H	30011
Lundbohm, H	29622
Means, T. H	30796
Merrill, G. P	29538, 30765
Patton, Dr. W	30152
Prentiss, Dr. D. W	30782
Pumpelly, R	30051, 30329
Squier, J. M	30067
Stearns, Dr. Frederick	30029
Strait, Hon. T. J	30710
Tate, William B	29825
The Carborundum Company, Monongahela, Pa	30290
Tiffany & Co	29717
Todd, Baxter	30412
Toms, C. F	29708, 29713, 29728, 30125
Turner, H. W	30103, 30424
Walcott, C. D	29578
Ward's Natural Science Establishment, Rochester, N. Y	29716, 30094
White, David	30226
Worthington, J	29613
Yale, Charles	29917

DEPARTMENT XIV.

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Abel, J. C	29543, 29684, 29875, 29965, 30129
Adams, H. Q	29547
Adler, Dr. Felix	30206
Babbit, J. O	29723
Bachman, G. W	30110
Bellucci, Prof. Guiseppe	30806
Ball, E. P	29983
Bettesworth, G. W	30242
Binkley, S. H	29727
Bishop, H. R	30037
Blanchard, G	30273
Burns, W. R	29649, 30671
Campbell, J. Macnaught	29881
Chapman, N. A	30675
Chittenden, N. H	30486
Dall, W. H	29964
Damon, R. F	30208
Daniel, Dr. Z. T	29669, 29683
De Turk, M. L	30264
Dieffenbach, J. G	30488
Dodge, B. E	30169
Emmert, J. W	30774
Frazar, G. B	30360
Geiger, W. M	30058
Guesde, A	29775
Hannah, R. H	29940
Harrison, B	30109
Helton, O. P	30466
Hester, L. G	30302
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Horniman Museum	29853
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Johnson, J. R	30588
Kennedy, Clarence	29725
Kent, A. J	30108
Knowles, W. A	30372
Knox, M. V. B	30565
Kremer, Rev. E. M	29984
Lewars, W. H	30259
Lewis, C. H	30331
Lüders, Dr. C. W	30191
Lummins, S. C	30390
McLemore, Tipton	30434
McMillan, P. A	30130
Marshall, Dr. E. B	30260
Matthews, P. F	29655, 29907
Miller, Charles, jr	30330
Montclar, M. le Marquis de	30189
Moore, P. A	30166
Morehead, W. K	30487
New Brunswick, Natural History Society of	30651
Nicklin, J. B	30087
Noyes, Isaac P	30716
Owen, Miss M. A	29899
Pearse, A. S	29802
Phelps, G. R	30717
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Pollard, Norval	30345, 30766, 30827
Pridemore, Gen. A. L	29857
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Samson, A. A	30393
Shelley, D. H	29682
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Snyder, Dr. J. J	30012
Spanogle, Samuel	30590
Steiner, Dr. Roland	29546, 29912, 30420
Stewart, Dr. T. B	29865, 29963
Stilwell, L. W	29818
Thompson, Mrs. J. M	30552
Torrey, Mrs. M. C. C	30709
Tracy, Andrew	30643
Tweed, J. W	30133
Way, N. S	30371
Weir, Paul	30619
Wilson, Miss S. R	30775, 30816
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Abbott, Dr. W. L	29960, 29967, 30743
Adler, Dr. Cyrus	29796, 29813, 30567
Adler, Dr. Felix	30206
Agriculture, Department of	30583
Allen, Pardon	20738
Azeez, Miss A. A	30209, 30210
Barber, Dr. E. A	30240
Bartleman, R. M	30729
Benjamin, William E	29660
Boas, Dr. Franz	30192
Bond, G. J	30340
Braida, S. C	30128
Brown, Capt. W. C., U. S. Army	30140
Bruce, N. W	30513

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Bryant, H. G 30514
Burnett, Dr. S. M 29798
Bush, S. S 30352
Campbell, W. P 29561
Carl, Wohlgemuth 30402
Cawood, W. H. H 29598
Crenshaw, Mrs. W. H 30769
Culin, Stewart 29698
Dall, W. H 30046
Damon, R. F 30208
Daniel, Dr. Z. T 30114
Deeble, Dr. H. M 30802
Dieffenbach, J. G 30488
Dorsey, G. A 29943
Fényes, Dr. A 30800
Fewkes, Dr. J. Walter 30432, 30606, 30781
Fukustima, Kimma 30496
Funk and Wagnall Company 30708
Germansky, A. L 29658
Glen Island Museum 29752, 30021
Goode, Dr. G. Brown 29795
Haddon, Dr. A. C 30002
Haskell, G. W 29809
Hawley, F. S 30825
Heade, M. J 30670
High School Museum, Saginaw, Mich 30083
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Hunton, T. G 30066
Jerichor, Professor 30622
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Kocher, Dr. J. F 30059, 30060, 30351
Kreko, Gabriel de 30519
Leggatt Brothers 29797
Lemke, Miss Elizabeth 30343
Lovett, Edward 30100
Lubny Museum, Russia 30688
McGuire, J. D 30220
Marashlian, S. S 30516
Matthews, Dr. Washington, U. S. Army 30086, 30151
Matthews, Mrs. Washington 30674
Merriam, Dr. C. H 30472
Merrill, G. P 29737
Merrill, H. C 30025
Morse, Rev. P. H 30544
Niblack, Lieut. A. P., U. S. Navy 30685
Palestine Exploration Fund, London 29586
Pennsylvania, University of 29701, 29702
Pettigrew, F. W 30233
Phillips, Barnet 30449
Robertson, E. L 29595
Rockhill, Hon. W. W 29892, 30022, 30613, 30677
Royal Zoological Museum, Florence, Italy 30742
Samson, Clara W 30625
Savage, M. F 29821, 30545, 30546
Schuyler, E. O 30492, 30624, 30801
Schlüter, Dr. Wilhelm 29605
Schweinburg, Fraulein Victoria 29891
Scidmore, Miss E. R 39262, 30271, 30585
Shipley, E. E 29961
Smithsonian Institution 29595, 30800

Accession number.

Smithsonian Institution (Bureau of Ethnology) 29664, 29889, 30341, 30497, 30498, 30579, 30646
Standinger and Bang Haas 29587
Wulzberger, S 29591
Wesley, William, & Son 29606, 29814, 29815
Wilkinson, E. C 29638

DEPARTMENT XVI.

Oriental Antiquities.

Adler, Dr. Cyrus 29805, 30144
Royal Museum, Berlin, Germany 29644
Turner, Mrs. W. W 30570

DEPARTMENT XVII.

Arts and Industries.

Abbott, Dr. W. L 29967
Adler, Dr. Cyrus 30319
Arup Brothers 30324
Autocopyist Company 30638
Beale, C. F. T 29636
Blackmar, Gen. W. W 30668
Blackford, J. W 29781
Brown, Mrs. J. Crosby 29593, 29793, 30167, 30431
Brown, W. D 30137
Brownell, estate of Lieut. Frank E 30411
Cartwright, O. C 30616
Castor, T. H., & Co 30798
Copp, John B 30249
Cranch, Mrs. C. D 29855, 30518
Daggett, Albert 30373
Davis, C. E 30405
Doubleday, Mrs. Abner 30406
Du Bose, Mrs. J. W 29643
Dugès, Dr. A 29751
Earle, J. S., & Sons 29678
Earll, R. E 30292, 30293
Electric Storage Battery Company, Philadelphia 29654
Elliott, R. I 30572
Evans, A. B 30348
Farmer, Miss S. J 30574
Fenyés, Dr. A 30800
Fish Commission, U. S 29551
Franklin & Co 29634
Gardner, A. L 29539
Gilder, R. W 30023
Glover, Rev. A. K 29581
Goode, Dr. G. Brown 29592
Griswold, N. L 30728
Hiatt, J. W 30652, 30696
Hornstein, L 30322
Interior Department (U. S. Patent Office) 30157
Japanese Fan Company, New York 29810
Jenson, Lawrence 29635
Jewett, Mrs 30719
Jörgenson, S. M 30689
Kan Ko Ba 29610
Kunz, G. F 29792
Langley, Hon. S. P 29616, 29617, 29618, 29619, 29794
Laun, John 30459
Lubny Museum, Russia 30688
Lycett, Edward 30323, 30422, 30736
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Mason, Prof. O. T	29862, 30683
Mayer, Robert, & Co	30635
Morse, E. L	30763
New Brunswick, Natural History Society of	30511, 30799
Philadelphia, City Council of	29918
Phytologic Museum, Australia	30398
Prestel, F. A. C	30637
Reed, H. A	29700
Rockhill, Hon. W. W	29808
Rockwood Pottery Company	30586
Savage, M. F	30547
Schott, Mrs. Augusta	30525
Schuyler, E. O	30801
Scidmore, Miss E. R	30540
Sheppard, Lieutenant, U. S. Navy	29863
Smithsonian Institution	29868 29981, 30406, 30689, 30800
Smolinski, Joseph	30770
Soria, Señor D. Arturo	29981
Souhami, A. R	30084
Swain, John, & Son	30636
Sweeny, T. W	30258
Tenney, Miss Hattie	29900
The Brusstar Ship Building Company	29919
The Telegraphic Historical Society of North America	30578, 30784
Tiffany, C. L	30453
Tiffany & Co	29790, 29791
Treasury Department, U. S	30363
True, F. W	30115
Tubb, C. L	30318
Turner, Miss S. W	30380
Van Deusen, R. T	30309
Ward's Natural Science Establishment	29596
Weeks, R	29657
Wise, Hon. H. S	29863

APPENDIX III.

List of Accessions to the Museum Library by Gift and Exchange during the Fiscal Year ending June 30, 1896.[1]

I.—INSTITUTIONS.

AFRICA.

Cape Colony.

Cape Town.

South African Museum.

Report of trustees, 1894–1895.

South African Philosophical Society.

Transactions, VIII, pt. 2, 1892–1895. (III, pt. 2; V, pt. 2; VI, pts. 1–2; VII, pt. 1; VIII, pt. 1.)

Egytp.

Cairo.

Institut Égyptien.

Bulletin (3) V, pts. 4–7, 1894. ((3)V, pts. 1–3.)

Société Khédiviale de Géographie.

Catalogue sommaire des monuments esposés dans le Musée National de l'art Arabe. Max Herz. Cairo, 1895. 12 mo, 187 pp.

AMERICA.

NORTH AMERICA.

British America.

Canada.

Chicoutimi.

Le Naturaliste Canadien, XXII, pts. 8–12, 1895; XXIII, pts. 1–5, 1896. (XXI; XXII, pts. 1–6.)

Halifax.

Nova Scotian Institute of Natural Science.

Proceedings and transactions, (2) I, pt. 4, 1895; II, pt. 1, 1895. (I, pt. 4; II; IV, pts. 1–3; V, pts. 3–4; VI–VII; (2) I, pts. 1–3.)

Montreal.

Geological Survey of Canada.

Annual reports (new series), VI, 1892–1893. (1843–1871, 1874–1891.)

Contributions to Canadian palæontology, II, pt. 1, 1895. (Complete.)

Maps, Nova Scotia, sheets Nos. 25–38. Ottawa, 1895. 8vo.

Maps of the principal auriferous creeks in the Cariboo mining district, British Columbia. Amos Bowman. Nos. 364–372. Ottawa, 1895. 8vo.

Paleozoic fossils, J. F. Whiteaves. III, pt. 2, 1895. (I, II, pt. 1; III, pt. 1.)

Natural History Society.

Canadian record of science, VI, pts. 3–8, 1894–1896. (Complete.)

St. Laurent College, Library and Museum.

Bulletins 10–11, 1894–1895.

Toronto.

Canadian Institute.

Functions of a great university. J. M. Clark. Toronto, 1895. 8 vo, 18 pp.

Transactions IV, pt. 2, 1895. (Complete.)

Ottawa.

Department of Agriculture, Central Experimental Farm.

Bulletins 21–23, 1895.

Report, 1894.

Quebec.

Université Laval.

Annuaire, 1895–1896. (1892–1894.)

[1] The numbers of volumes and parts given in parentheses at the end of each citation indicate what the library already possessed of the various series.

St. John.
NATURAL HISTORY SOCIETY OF NEW BRUNSWICK.
Bulletins 13–14, 1895. (1–5, 10–11.)
Teredo notes. E. T. P. Shewen. St. John, 1895. 8 vo, 6 pp.
Winnipeg.
DEPARTMENT OF AGRICULTURE AND IMMIGRATION.
Bulletins 47–48, 1895. (44–45.)

Mexico.

Aguascalientes.
EL INSTRUCTOR, XII, pts. 3–4, 1895.
Mexico.
COMISION GEOLOGICA.
Boletín 1, 1895.
INSTITUTO GEOLOGICO DE MÉXICO.
Boletín 2, 1895.
Description d'un Axolotl des montagnes de Las Cruces. Alf. Duges. México, 1895. 8 vo, 6 pp.
Expedicion científica á Popocatepetl. G. José. México, 1895. 8 vo, 48 pp.
INSTITUTO MÉDICO NACIONAL.
Anales, I, pt. 8, 1896. (Complete.)
MEXICAN COMMISSION OF THE ATLANTA EXPOSITION.
Arte del idioma tarasco . . . año de 1714. P. F. D. Basalenque. México, 1886. fol, 86 pp.
Cartilla huasteca con su gramática, diccionario, y varias reglas para aprender el idioma. Marcelo Alejandre. México, 1890. fol., 179 pp.
Coleccion de documentos é informes sobre la Langosta, qua ha invadido la República . . . 1879–1886. México, 1886. 8vo, 705 pp.
Datos para la materia médica Mexicana. Pt. 1. México, 1895. 8vo, 515 pp.
Estudio arqueológico y jeroglífico del calendario ó gran libro astronómico, histórico, cronológico de los antiquos Indios. D. Abadiano. México, 1889. 8vo, 202 pp.
Flora Mexicana. Ed. 2, M. Sessé and J. M. Mociño. México, 1894. fol, 249 pp.
Gramática de la lengua zapoteca. México, 1886. fol, 143 pp.
Historia de la médicina en México, 1–111. México, 1886–1888. 4to.
Mexico—Continued.
MEXICAN COMMISSION OF THE ATLANTA EXPOSITION—Continued.
Nombres géográficos del estado de Tabasco. J. N. Rovirosa. México, 1888. 4to, 36 pp.
Piscicultura en aqua dulce. Estéban Cházari. México, 1884. 8vo, 828 pp.
Plantæ novæ Hispaniæ. Ed. 2. M. Sessé and J. M. Mociño. México, 1893. fol, 175 pp.
Sinopsis mineralógica. C. F. de Landero. México, 1891. 8vo, 528 pp.
Tratado de geología. Mariano Bárcena. México, 1886. 8vo, 435 pp.
MUSEO NACIONAL DE MÉXICO.
Catálogo de la collección de anthropología. No. 4. H. L. Herrera. México, 1895. 8vo, 164 pp.
Catálogo de la collección de aves del Museo Nacional. No. 2. H. L. Herrera. México, 1895. 8vo, 114 pp.
Catálogo de la collección de mamíferos del Museo Nacional. No. 1. H. L. Herrera. México, 1895. 8vo, 41 pp.
Catálogo de la collección de reptiles y batracios. No. 3. H. L. Herrera. México, 1895. 8vo, 65 pp.
Catálogo del departamento de arqueología. No. 1. Jesus Galindo. México, 1895. 102 p.
Guia para visitar los salones de história de México. México [n. d.]. 8vo, 147 pp.
Sociedad científica. "Antonia Alzate." Memorias y revista, IX, pts. 1–6, 1895–1896. (III–VII.)
Tacubaya.
COSMOS. I, pts. 1–24; II, pts. 1–10, 1892–1893.

United States.

Alabama.

Auburn.
AGRICULTURAL EXPERIMENT STATION.
Bulletins (new series), 70–71, 1896. (New series), 1–66.)
Birmingham.
NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.
Proceedings, IX, pt. 2, 1896.

Arizona.

Tucson.

AGRICULTURAL EXPERIMENT STATION.

Bulletins 13–14, 1895.

Arkansas.

Fayetteville.

AGRICULTURAL EXPERIMENT STATION.

Annual reports, 1889–1892.

Bulletins 20, 30–31, 1891–1894. (2, 5–10, 12–19.)

California.

Berkeley.

COLLEGE OF AGRICULTURE—EXPERIMENT STATION.

Bulletins 109–110, 1896. (82–108.)

Report of the work of the agricultural experiment stations. Sacramento, 1896. 8vo, 481, pp.

UNIVERSITY OF CALIFORNIA.

Bulletin of the department of geology, I, pts. 10–14, 1895–1896. (Complete.)

Critical periods in the history of the earth. Joseph Le Conte. Berkeley, 1895. 8vo, 24 pp.

Lick Observatory contributions. No. 5, 1895. (Complete.)

Olives, pickling processes, etc. A. P. Hayne. Sacramento, 1895. 8vo, 37 pp.

Register, 1895–1896. (1875, 1877–1883, 1887–1895.)

Palo Alto.

LELAND STANFORD JUNIOR UNIVERSITY.

Fishes of Sinaloa. David Starr Jordan. Palo Alto, 1895. 8vo, 64 pp.

Publications (geology and palæontology), No. 1, 1895.

San Diego.

OUT OF DOORS FOR WOMEN, II, pt. 21, 1895. (I, pts. 1–2.)

WEST AMERICAN SCIENTIST, IX, pt. 80, 1895. (I, pts. 1, 3, 5, 10–11; II, pts. 12–19; III, pts. 22–24, 26–31; IV, pts. 33–38; VII–VIII; IX, pt. 78.)

Sacramento.

CALIFORNIA STATE MINING BUREAU.

Bulletins, 5–8, 1895–1896. (4.)

San Francisco.

CALIFORNIA ACADEMY OF SCIENCES.

Memoirs, II, t. 5, 1896. (II, pts. 1–4.)

Proceedings, (2) V, pts. 1–2, 1896. (I–VI; VII, pt. 1; (2) I–IV.)

San Francisco—Continued.

INDUSTRY, pts. 84–90, 1895–1896. (Pts. 74, 76–83.)

Colorado.

Colorado Springs.

COLORADO COLLEGE.

Studies, VI, 1896. (Complete.)

Denver.

COLORADO SCIENTIFIC SOCIETY.

Determination of bismuth in refined lead. L. G. Eakins. Denver, 1895. 8vo, 9 pp.

Dyke on the Columbia vein in Ward district, Boulder County, Colo. C. S. Palmer and W. B. Stoddard. Denver, 1895. 8vo, 6 pp.

Nickel deposits near Riddles, Oregon. W. L. Austin. [Denver, 1896.] 8vo, 27 pp.

Occurrence of Tellurium in oxidized form associated with gold. Richard Pearce. Denver, 1895. 8vo, 4 pp.

Proceedings, IV, 1891–1893. (II, pts. 1-2; III, pts. 1–3.)

Recent history and present status of chemistry. Charles S. Palmer. Denver, 1894. 8vo, 15 pp.

Some notes on the occurrence of Uraninite in Colorado. Richard Pearce. Denver, 1895. 8vo, 3 pp.

Vein structure in the Enterprise mine. T. A. Richard. Denver, [n. d]. 8vo, 8 pp.

Volcanic rock of Alum Hill, Boulder County, Colo. C. Irving Andrews. Denver, 1895. 8vo, 8 pp.

MINING REVIEW, XXXIV, pts. 26–32, 1895. (XXXI, pts. 4–24, 26; XXXII; XXXIII, pts. 2–3, 5–11, 17–26; XXXIV, pts. 1–25.)

Fort Collins.

STATE AGRICULTURAL COLLEGE EXPERIMENT STATION.

Bulletin 31, 1893. (4–6, 9–30.)

Connecticut.

Meriden.

SCIENTIFIC ASSOCIATION.

Annual address. J. T. Pettee. Meriden, 1893. 8vo, 31 pp.

Transactions, II, 1885–1886; V, 1893. (III-IV.)

New Haven.

CONNECTICUT ACADEMY OF ARTS AND SCIENCES.

Transactions, IX, pt. 2, 1895. (V, pt. 1, 6-8.)

CONNECTICUT STATE BOARD OF HEALTH.

Monthly bulletin, X, pt. 2, 1895. (II, pts. 11-12; III-VII; VIII, pts. 8-11; IX, pts. 2, 9.)

Portland.

OBSERVER, THE. VI, pts. 9-12, 1895; VII, pts. 1-4, 1896. (Complete.)

PRACTICAL MICROSCOPY, VI, pt. 8, 1895. (VI, pts. 1, 4.)

Delaware.

Wilmington.

DELAWARE COLLEGE AGRICULTURAL EXPERIMENT STATION.

Sixth annual report, 1893. (Complete.)

Bulletins 25-26, 1895. (Complete.)

District of Columbia.

Washington.

AGRICULTURE, DEPARTMENT OF.

Bureau of Animal Industry.

Bulletin 10, 1896. (4, 6-7.)

Circular, Nos. 4-5, 1895.

Division of Agricultural Soils.

Bulletin 5, 1896. (2-4.)

Division of Agrostology.

Bulletins 1-2, 1895-1896.

Division of Entomology.

Insect life, VII, pt. 5, 1895. (Complete.)

Technical Series No. 1.

Division of Forestry.

Circular, Nos. 11 and 13, 1896.

Division of Ornithology and Mammalogy.

North American Fauna, No. 10, 1895. (Nos. 1-5, 7-8.)

Division of Statistics.

Bulletin 9, 1895. Miscellaneous series.

Library.

Bulletins 8, 10-11, 1895-96. (1-4, 6-7.)

Office of Experiment Station.

Bulletins 28-29, 1896. (22, 24-26.)

Report of the Secretary, 1895. (1889, 1891, 1893.)

Section of Foreign Markets.

Circular No. 8 [n. d.].

Washington—Continued.

AGRICULTURE, DEPARTMENT OF—Continued.

Weather Bureau.

Monthly Weather Review, XXIII, pts. 6-10, 1895. (XXI, pts. 10-13; XXII, XXIII, pts. 1-5.)

Weather report: Nebraska weather review, 1895.

AMERICAN JEWISH HISTORICAL SOCIETY.

Publications, pts. 2-4, 1889-1896 (Complete.)

AMERICAN MONTHLY MICROSCOPICAL JOURNAL, XVI, pts. 7-12, 1895; XVII, pts. 1-6, 1896. (I, pt. 2; II, pt. 4.; V, pts. 1-11; VI, pts. 1-5, 7-9, 11; VII, pts. 4, 6, 10; VIII, pts. 4-5, 7-12; IX; XI, pts. 1-11; XII; XIII, pts. 2-12; XIV-XV; XVI, pts. 1-6.)

ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

AMERICAN ANTHROPOLOGIST, VIII, pts. 2-4, 1895; IX, pts. 1-6, 1896. (Complete.)

ASSAY COMMISSIONERS, BOARD OF.

Proceedings, 1896.

BIOLOGICAL SOCIETY OF WASHINGTON.

Proceedings, X, pp. 55-92, 115-125, 1896. (Complete.)

CENSUS BUREAU.

Abstract of the Eleventh Census, 1890. Ed. 2. Washington, 1896. 8vo, 300 pp.

Report on crime, pauperism, and benevolence in the United States. Pt. 2. General tables. F. H. Wines. Washington, 1895. 4to, 1035 pp.

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APPENDIX IV.

Bibliography of the U. S. National Museum for the Fiscal Year Ending June 30, 1896.

(With supplements containing lists of the new families, genera, and species described.)

PUBLICATIONS OF THE MUSEUM.[1]

ANNUAL REPORT.

Annual Report | of the | Board of Regents | of the | Smithsonian Institution, | showing | the Operations, Expenditures, and Condition | of the Institution | for the | year ending June 30, 1893. | — | Report | of the | U. S. National Museum. | — | Washington: | Government Printing Office. | 1895.

8vo, pp. I–XXI, 1–794, 184 pls., 116 figs.

PROCEEDINGS.

Smithsonian Institution. | United States National Museum. | — | Proceedings | of the | United States National Museum. | — | Volume XVII. | 1894. | — | Published under the direction of the Smithsonian Institution. | — | Washington: | Government Printing Office. | 1895.

8vo, pp. I–XIII, 1–765, pls. I–XXXII, 90 figs.

BULLETIN.

Smithsonian Institution. | United States National Museum. | — | Directions for Collecting Minerals. | By | Wirt Tassin, | Assistant Curator of the Department of Minerals. | — | Part H of Bulletin of the United States National Museum, No. 39. | — | Washington: | Government Printing Office. | 1895.

8vo, pp. [1]–[6], figs. 1–8.

Smithsonian Institution. | United States National Museum. | — | Directions for Collecting Rocks and for | the Preparation of Thin Sections. | By | George P. Merrill, | Curator of the Department of Geology. | — | Part I of Bulletin of the United States National Museum, No. 39. | — | Washington: | Government Printing Office. | 1895.

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Smithsonian Institution. | United States National Museum. | — | Directions for Collecting Specimens and | Information Illustrating the | Aboriginal Uses of Plants. | By | Frederick V. Coville, | Honorary Curator of the Department of Botany. | — | Part J of Bulletin of the United States National Museum, No. 39. | — | Washington: | Government Printing Office. | 1895.

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Smithsonian Institution. | United States National Museum. | — | Directions for Collecting and Preparing Fossils. | By | Charles Schuchert, | Assistant Curator of the Department of Paleontology. | — | Part K of Bulletin of the United States National Museum, No. 39. | — | Washington: | Government Printing Office. | 1895.

8vo, pp. [1]–[31], figs. 1–13.

[1] The titles of the papers from the Report and Proceedings of the National Museum, which were published in separate form during the year, are given in Appendix V.

PAPERS BY OFFICERS OF THE NATIONAL MUSEUM AND OTHERS, BASED ON MUSEUM MATERIAL.

ADLER, CYRUS. Museum collections to illustrate religious history and ceremonials.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1893 (1895), pp. 755–768.

—— Two Persepolitan casts in the U. S. National Museum.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1893 (1895), pp. 749–753, pls. 1, 2.

AMERICAN ORNITHOLOGISTS' UNION. Checklist | of North American Birds | Prepared by a Committee | of the | American Ornithologists' Union. | Second and revised edition. | — | New York | American Ornithologists' Union. | 1895.

8vo, pp. I–XI, pp. 1–372.

This new and revised list of North American birds contains the names of one thousand and seventy-one species and subspecies of recent birds, with a concise statement of their geographical distribution; of sixty-four fossil species, arranged under the geological periods to which they belong; and of twenty-six hypothetical species, with a short notice regarding their present status.

ANTHONY, A. W. New races of *Colaptes* and *Passerella* from the Pacific Coast.

Auk, XII, No. 4, Oct., 1895, pp. 347–349.

Colaptes chrysoides brunnescens, and *Passerella iliaca stephensi* are described.

—— A new species of the genus *Dryobates*.

Auk, XIII, No. 1, Jan., 1896, pp. 31–34.

Dryobates villosus montanus is described.

ASHMEAD, WILLIAM H. Description of a new species of *Telenomus* bred by Mr. F. W. Urich from a Coccid.

Journ. Trinidad Field Nat. Club, II, Aug., 1895, p. 220.

Describes *Telenomus minutissimus*, n. sp.

—— Description of a new genus and new species of Proctotrypid bred by Mr. F. W. Urich from an Embiid.

Journ. Trinidad Field Nat. Club, II, 1895, pp. 264–266.

Describes *Embidobia*, n. g., and *E. urichi*, n. sp.

—— Report on the parasitic Hymenoptera of the Island of Grenada, comprising the families Cynipidæ, Ichneumonidæ, Braconidæ, and Proctotrypidæ.

ASHMEAD, WILLIAM H.—Continued.

Proc. Zool. Soc. Lond., XLVIII, 1895 (Apr., 1896), pp. 742–812.

Reports on one hundred and eighty-six species of parasitic Hymenoptera collected on this island by Mr. Herbert H. Smith. Six new genera and one hundred and twenty-eight species are new to science.

—— Descriptions of new parasitic Hymenoptera. (Paper No. 2.)

Trans. Am. Ent. Soc. Phila., XXIII, No. 2, Apr.–June, 1896, pp. 179–234.

Describes five new genera and one hundred and twenty-seven new species, sixty-seven of which are in the National Museum.

BENDIRE, CHARLES. The Cowbirds.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1893 (1895), pp. 587–624, pls. 1–3.

BENEDICT, JAMES E. Preliminary descriptions of a new genus and three new species of Crustaceans from an artesian well at San Marcos, Tex.

Proc. U. S. Nat. Mus., XVIII, No. 1087, Apr. 14, 1896, pp. [1], [2]. Advance edition.

Describes three blind crustaceans, a shrimp, an isopod, and an amphipod, taken by the U. S. Fish Commission from an artesian well 188 feet deep at San Marcos, Texas.

BISHOP, LOUIS B. Description of a new Horned Lark and a new Song Sparrow, with remarks on Sennett's Nighthawk.

Auk, XIII, No. 2, Apr., 1896, pp. 129–135.

Otocoris alpestris hoyti and *Melospiza fasciata juddi*, both from North Dakota, are described as new subspecies. Remarks are offered on the validity of *Chordeiles virginianus sennetti*.

BREWSTER, WILLIAM. Descriptions of a new Warbler and a new Song Sparrow.

Auk, XIII, No. 1, Jan., 1896, pp. 44–47.

Compsothlypis americana usnea from Maine and *Melospiza fasciata merrilli* from Mt. Sherman, Idaho, are described as new subspecies.

CALVERT, PHILIP P. Notes on the Odonata from East Africa collected by the Chanler expedition.

Proc. U. S. Nat. Mus., XVIII, No. 1047, Apr. 15, 1896, pp. 143–145.

Gives full synonymy of the seven species of dragon flies collected by the Chanler-Höhnel expedition up the Tana River. Measurements and notes on the genitalia are added.

—— East African Odonata collected by Dr. W. L. Abbott.

Proc. U. S. Nat. Mus., XVIII, No. 1046, Apr. 23, 1896, pp. 121–142.

CALVERT, PHILIP P.—Continued.

Of the thirteen species of dragon flies collected by Dr. W. L. Abbott in the Kilimanjaro region and on the Seychelles, four species are here described as new and most of the older species are redescribed, special attention being given to the sexual characters, which are illustrated by fifteen woodcuts.

CASANOWICZ, I. M. The Jews of southern Russia.

Am. Anthropologist, IX, Apr., 1896, pp. 143–145.

CHAPMAN, FRANK M. The changes of plumage in the Dunlin and Sanderling.

Bull. Amer. Mus. Nat. Hist., VIII, Art. 1, Mar., 1896, pp. 1–8.

Attention is directed to Gätke's claim that changes of color occur in these species without molt, which is denied by the author of the present paper.

CHERRIE, GEORGE K. An apparently new *Chordeiles* from Costa Rica.

Auk, XIII, No. 2, Apr., 1896, pp. 135, 136.

Chordeiles virginianus aserriensis, from San José, Costa Rica, is described as new.

CHITTENDEN, F. H. The more important insects injurious to stored grain.

Yearbook U. S. Dept. Agric., 1894 (July, 1895), pp. 287–294, 9 figs.

A popular scientific account of thirteen common injurious insects that affect stored cereals, with a general consideration of the subject and the means of control.

—— Some Coleopterous enemies of the grapevine.

Insect Life, VII, No. 5, July, 1895, pp. 384–387.

A list of the beetles injuring the grapevine, supplementary to a list of thirty-six species published by Mr. Lawrence Bruner in the Report of the Nebraska State Horticultural Society for 1895.

—— The Horse-radish Flea-beetle.

Insect Life, VII, No. 5, July, 1895, pp. 404–406, 1 fig.

An account of the introduction of the European *Phyllotreta armoraciæ* into this country, and its damage to horse-radish, together with a consideration of its habits.

—— Two new species of beetle of the Tenebrionid genus *Echocerus*.

Proc. U. S. Nat. Mus., XVIII, No. 1041, Apr. 23, 1896, pp. 79, 80.

CLARKE, FRANK W. Note on a garnet from California.

Am. Journ. Sci. (Series 3), L, July, 1895, p. 76.

—— [Review of] On the densities of oxygen and hydrogen, and on the ratio of their atomic weights, by Edward W. Morley. *Smithsonian Contrib. to Knowl.*, XXIX, 1895, pp. 1–128, figs, 1–40.

Journ. Am. Chem. Soc., XVIII, No. 2, Feb., 1896, p. 192.

—— Third annual report of committee on atomic weights. Results published during 1895.

Journ. Am. Chem. Soc., XVIII, No. 3, Mar., 1896, p. 197.

COMSTOCK, F. M. The Parasitic Jaeger near Cleveland, Ohio.

Auk, XIII, No. 2, Apr., 1896, p. 171.

Two specimens of this species (one of which was sent to the Smithsonian Institution) are recorded from the vicinity of Cleveland, Ohio.

CONANT, F. S. Notes on the Chætognaths.

Johns Hopkins Univ. Circ., XV, No. 126, June, 1896, pp. 82–85.

The first chapter is upon Egg-laying, based upon observations of *Sagitta hispida*, Conant; the second, on the Diverticulata of the Intestine, and the third on Classification. This is followed by short descriptions of nine American species of Chætognaths.

COOK, O. F. *Priodesmus*, a new genus of Diplopoda from Surinam.

Proc. U. S. Nat. Mus., XVIII, No. 1037, Apr. 23, 1896, pp. 53–57, pl. 1, figs. 1–19.

Describes a new genus of Diplopods which has for its type a new species, *Priodesmus acus*, from Surinam, in the National Museum collection. A second species of the genus is described from Para, Brazil, which is in the Berlin Museum. The plate gives structural details of *P. acus*.

—— Two new Diplopod Myriapoda of the genus *Oxydesmus* from the Congo.

Proc. U. S. Nat. Mus., XVIII, No. 1036, Apr. 23, 1896, pp. 47–52.

Describes two interesting new species of myriapods (*Oxydesmus campii* and *O. flabellatus*) collected in the Congo Free State by Rev. J. H. Camp.

—— An arrangement of the Geophilidæ, a family of Chilopoda.

Proc. U. S. Nat. Mus., XVIII, No. 1039, Apr. 23, 1896, pp. 63–75.

All the known genera are here reviewed, thirty-four being recognized as valid. These are classified into nine families. The whole group is elevated to the rank of superfamily under the name Geophiloidæ.

—— On *Geophilus attenuatus*, Say, of the class Chilopoda.

Proc. U. S. Nat. Mus., XVIII, No. 1038, Apr. 23, 1896, pp. 59–62.

COOK, O. F.—Continued.

The author comes to the conclusion that the species long known in Europe as *Geophilus ferrugineus*, Koch, also occurs on this continent, and is identical with Say's species. It has the generic characters of *Mecistocephalus* of Newport, and should now be called *Mecistocephalus attenuatus*, Say.

—— East African Diplopoda of the suborder Polydesmoidea, collected by William Astor Chanler.

Proc. U. S. Nat. Mus., XVIII, No. 1042, Apr. 23, 1896, pp. 81–111, pl. II–VI.

A complete monograph of the species of this group known from East Africa, based partly on the material in the Berlin Museum. Analytical tables are given of the seven families occurring in Africa and of the genera of the three families represented in East Africa. Three new genera and five new species are described. The types are: Three in the National Museum (coll. Chanler-Höhnel), one in the British Museum, and one in Berlin. Structural details of all the known East African species are shown in the plates.

COQUILLETT, DANIEL W. Two Dipterous Leaf-miners on garden vegetables.

Insect Life, VII, No. 5, July, 1895, pp. 381–384, 2 figs.

An account of the habits of *Drosophila flaveola* and its injury to radishes by mining the leaves, and of *Trypeta fratria*, and its damage to parsnips by similar work.

—— Two dipterous insects injurious to cultivated flowers.

Insect Life, VII, No. 5, July, 1895, pp. 399–402, 1 fig.

An account of the habits and transformations of *Phytomyza chrysanthemi* and of its damage to Chrysanthemums. Also an account of a Cecidomyiid fly and its damage to the garden poppy.

—— A new wheat pest.

Insect Life, VII, No. 5, July, 1895, pp. 406–408, 1 fig.

A consideration of *Sciara tritici*, n. sp., and of its probable damage to young wheat plants.

—— Diptera of Florida.

Proc. Acad. Nat. Sci. Phila., 1895, pp. 307–319.

Describes three new genera and eighteen new species, two of the latter being founded partly on specimens in the National Museum.

—— Culicidæ from North America.

Canadian Entomologist, XXVIII, No. 2, Feb., 1896, p. 43.

Describes three new species, two of which are based on specimens in the National Museum.

COQUILLETT, DANIEL W.—Continued.

Revision of the North American Empidæ, a family of two-winged insects.

Proc. U. S. Nat. Mus., XVIII, No. 1073, May 25, 1896, pp. 387–440.

An analytical key is given to the thirty-four genera of this family recognized as occurring in North America, four of which are described as new. Twelve genera have analytical keys to their species, and sixty-six new species are described.

CORY, CHARLES B. Descriptions of two new species of birds from Santo Domingo.

Auk, XII, No. 3, July, 1895, pp. 278, 279.

Hyetornis fieldi and *Elainia cherriei* are described as new.

COULTER, JOHN M. Preliminary revision of the North American species of *Echinocactus*, *Cereus*, and *Opuntia*.

Contrib. U. S. Nat. Herbarium, III, No. 7, Apr. 1, 1896, pp. 355–462.

This paper is a monograph of *Echinocactus*, *Cereus*, and *Opuntia*, and forms the second part of Professor Coulter's work on North American Cactaceæ.

COULTER, JOHN M., and ROSE, JOSEPH NELSON. *Deanea*, a new genus of Umbelliferæ from Mexico.

Botan. Gaz., XX, No. 8, Aug., 1895, pp. 372, 373, pl. XXVII.

The genus *Deanea* is named for Mr. Walter Deane, of Cambridge, Mass. It contains two species, viz: *nudicaulis* and *tuberosa*, both natives of western Mexico.

—— Umbelliferæ.

Contrib. U. S. Nat. Herbarium, III, Nov., 1895, pp. 227–288.

This article forms a portion of a report on a collection of plants made by J. M. Sandberg and assistants in northern Idaho in the year 1892. Twenty-three species are enumerated. *Peucedanum salmoniflorum*, Coulter and Rose, is described as new.

—— Report on Mexican Umbelliferæ, mostly from the State of Oaxaca, recently collected by C. G. Pringle and E. W. Nelson.

Contrib. U. S. Nat. Herbarium, III, No. 5, Dec. 14, 1895, pp. 289–309, pls. V–X.

A history of the collection is given, with notes on each station visited, and a catalogue of the species. Four new genera and 26 new species are reported upon. The following species are figured: *Coaxana purpurea*, *Deanea nudicaulis*, *Neogoezia gracilipes*, *Neogoezia minor* *Neonelsonia ovata*, *Osmorrhiza mexicana*.

COVILLE, FREDERICK VERNON. *Juncus scirpoides* and its immediate relatives.

Bull. Torrey Botan. Club, XXII, July 31, 1895, pp. 302–305.

Notes upon the group, key to the species, descriptions, and synonymy of four species.

—— The botanical explorations of Thomas Coulter in Mexico and California.

Botan. Gaz., XX, Dec. 16, 1895, pp. 519–531, 1 map.

This paper embraces a biographical sketch of Dr. Thomas Coulter, an account of his travels in America, extracts from his writings descriptive of his travels in California, a bibliography of papers based on Dr. Coulter's collections, and a chronological list of most of the species bearing his name.

—— Directions for collecting specimens and information illustrating the aboriginal uses of plants.

Bull. U. S. Nat. Mus., No. 39, Part J, 1895, pp. [1]—[8].

—— Botany of Yakutat Bay, Alaska.

Contrib. U. S. Nat. Herbarium, III, No. 6, Jan. 15, 1896, pp. 325–353.

Field report by Frederick Funston. Catalogue of species collected in Alaska by Frederick Funston in 1892.

—— Report of the Chief of the Division of Botany for 1895.

Rep. Secy. Agric., 1895 (June 11, 1896), pp. 159–164.

—— Some additions to our vegetable dietary.

Yearbook U. S. Dept. Agric., 1895 (1896), pp. 205–214, 9 figs.

Popular descriptions and illustrations of native and introduced plants most commonly used for pot herbs or greens.

COX, ULYSSES O. A collection of birds from Mount Orizaba, Mexico.

Auk, XII, No. 4, Oct., 1895, pp. 356–359.

A list of species, with brief notes, and a description of the recently new *Pipilo orizabæ*, Cox.

(See also under BARTON W. EVERMANN.)

CULIN, STEWART. Chinese games with dice and dominoes.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1893 (1895), pp. 489–537, pls. 1–12, figs. 1–33.

DALL, WILLIAM HEALEY. The St. Elias Bear.

Science (New series), II, No. 30, July 26, 1895, p. 87.

DALL, WILLIAM HEALEY—Continued.

A new species of bear, *Ursus emmonsi*, from the St. Elias region, is described from skins seen at Sitka. Photographs of other skins are in the Museum collection.

—— Description of a new *Vitrea* from Puget Sound.

Nautilus, IX, No. 3, July, 1895, pp. 27, 28.

Vitrea johnsoni, from near Seattle, and *V. subrupicola*, var. *spelæa*, Dall, from Cave City, Calaveras County, Cal., are described. Both types are in the National Museum.

—— Three new species of *Macoma* from the Gulf of Mexico.

Nautilus, IX, No. 3, July, 1895, pp. 32–34.

Macoma limula, ranging from North Carolina to Barbados; *M. mitchelli*, from Matagorda Bay, Texas; and *M. leptonoidea*, from the same locality, are described. The types are in the National Museum collection.

—— Synopsis of the subdivision of *Holospira* and some related genera.

Nautilus, IX, No. 5, Sept., 1895. pp. 50–57.

The genera *Holospira*, *Cœlocentrum*, and *Eucalodium* are divided into five subgenera and eleven sections on the internal characters of the shell, of which five sections and two subgenera are described as new.

—— On the discovery of fat and muscular fiber belonging to remains of a mammoth on the peninsula of Alaska.

Science (New series), II, No. 45, Nov. 8, 1895, p. 636.

An account of specimens obtained by Mr. W. J. Fisher. These specimens are from the "ground-ice" formation on the Naknek River, Alaska, now in the National Museum.

—— Alaska as it was and is, 1865–1895. Annual presidential address, delivered before the Philosophical Society of Washington, December, 1895.

Bull. Philosoph. Soc. Wash., XIII, Dec., 1895, pp. 123–162.

This article reviews the changes of thirty years in Alaska, as observed by the author, and summarizes the results of explorations in the territory growing out of the work of Robert Kennicott and his party, with a bibliography of scientific papers relating thereto.

The text of this paper was reprinted in *Science* (New series), III, No. 54, Jan. 10, 1896, pp. 37–45, and No. 55, Jan. 17, 1896, pp. 87–92.

—— [Review of] A catalogue of the marine mollusks of Japan, with descriptions of new species and notes on others collected by Frederick Stearns. By Henry A. Pilsbry. Detroit, 1895. 8vo, pp. I–VIII, 1–196, pls. I–IX.

DALL, WILLIAM HEALEY—Continued.

Science (New series), II, No. 57, Dec. 20, 1895, pp. 855, 856.

A review of a catalogue based on the literature and on the collections made by Mr. Stearns. A portion of these collections is now in the National Museum.

—— [Review of] Die Gastropoden der Plankton-Expedition. By Dr. H. Simroth. Kiel and Leipsic, Lipsius and Fischer. 1895. 4to, pp. 1–206, pls. 1–22.

Science (New series), III, No. 54, Jan. 10, 1896, p. 69.

A review of the important work on the Plankton gastropods by Simroth, published by Lipsius and Fischer.

—— New data on *Spirula*.

Science (New series), III, No. 59, Feb. 14, 1896, pp. 243–245.

From specimens of *Spirula* in the National Museum collection the author is enabled to correct certain errors in the Challenger Monograph of *Spirula* by Huxley and Pelseneer, and to show the probability that this animal, though able to swim, is generally sessile in deep water on stones or other solid objects.

—— On some new species of *Scala*.

Nautilus, IX, No. 10, Feb., 1896, pp. 111, 112.

Description of an Oligocene, a Miocene, and one recent species of *Scala* represented in the collection of the National Museum and that of Mr. W. G. Mazyck.

—— [Review of] Geological biology; an introduction to the geological history of organisms, by Henry S. Williams. New York, 1895, pp. I–XX, 1–395, with illus.

Science (New series), III, No. 64, Mar. 20, 1896, pp. 445–447.

A review of the work in question, illustrating its scope and character.

—— Geographical notes on Alaska.

Bull. Am. Geographical Soc., XXVIII, No. 1, Mar., 1896, pp. 1–20.

Summary of geographic notes made during the summer of 1895, together with cartographic data on the Aleutian region and some anthropological notes on native map drawing.

—— The so-called Jeannette relics.

National Geographic Magazine, VII, No. 3, Mar., 1896, pp. 93–98.

In this paper the authenticity of the so-called Jeannette relics, found off the coast of Greenland in 1884, is questioned and discussed, together with the bearing of the discovery on Nansen's polar explorations.

DALL, WILLIAM HEALEY—Continued.

The Russo-American telegraph project of 1864–1867.

National Geographic Magazine, VII, No. 3, Mar., 1896, pp. 110, 111.

This is a brief account of the chief facts connected with the expedition referred to

—— Diagnoses of new tertiary fossils from the southern United States.

Proc. U. S. Nat. Mus., XVIII, No. 1035, Apr. 23, 1896, pp. 21–46.

Descriptions of forty-three new species, two new subgenera, one new section, and five new varieties, chiefly of Miocene and Oligocene fossils from the southern states and the Antillean region. The Opisthobranchiata, Terebridæ, Conidæ, and Umboniidæ furnish most of the species. The presence of the Egyptian genus *Carolia* is for the first time noted in American beds.

—— Diagnoses of new mollusks from the survey of the Mexican boundary.

Proc. U. S. Nat. Mus., XVIII, No. 1033, Apr. 23, 1896, pp. 1–6.

Descriptions of eleven new species, one new variety and one new subgenus in the Museum collection, chiefly of land shells collected by Dr. E. A. Mearns in the vicinity of the Mexican boundary.

—— Diagnoses of new species of mollusks from the northwest coast of America.

Proc. U. S. Nat. Mus., XVIII, No. 1034, Apr 23, 1896, pp. 7–20.

Descriptions of twenty-seven new species and two new genera of marine mollusks dredged on the west coast of America by the U. S. Fish Commission steamer *Albatross*. Types of these species are in the National Museum collection.

—— New species of *Leda* from the Pacific coast.

Nautilus, X, No. 1, May, 1896, pp. 1, 2.

Descriptions of three new species of *Leda* in the National Museum, from the western coast of the United States.

—— [Review of] Text-book of Comparative Anatomy, Part II, Mollusca. By Arnold Lang. Translated by H. M. and M. Bernard. London and New York, Macmillan & Co. 1896. 8vo, pp. xvi+618, with illus.

Science (New series), III, No. 75, June 5, 1896, pp. 847–849.

Review of the work mentioned, with corrections of inaccuracies therein.

—— Note on *Neritina showalteri*, Lea.

Nautilus, X, No. 2, June, 1896, pp. 13–15.

The types of this species in the National

DALL, WILLIAM HEALEY—Continued.

Museum are discussed, and the animal shown to belong to a new genus, *Lepyrium*, which is here described.

—— Scientific results of explorations by the U. S. Fish Commission Steamer *Albatross*. No. XXXIV.—Report on Mollusca and Brachiopoda dredged in deep water, chiefly near the Hawaiian Islands, with illustrations of hitherto unfigured species from northwest America.

Proc. U. S. Nat. Mus., XVII, No. 1032, July 8, 1895, pp. 675–733, pls. XXIII–XXXII.

This paper includes the description of mollusks and brachiopods dredged on the Archibenthal plateau about the Hawaiian Islands, as well as others obtained by the *Albatross* on the western coast of America. A large number of species hitherto unfigured are fully illustrated, and twenty-nine new species, four new subgenera, two new genera, and one new family are described. The types of all are in the Museum. Apart from descriptions of new forms the most important feature of the paper is found in the anatomical data relating to the genera *Euciroa* and *Halicardia*, *Callocardia* and *Lyonsiella*, the subgenus *Spergo* of the Pleurotomidæ, *Ancistrolepis* of the Buccinidæ, and the brachiopod genus *Frieleia*. It is shown that in the genus *Halicardia* a peripedal septum is formed by a thick outgrowth from the mantle independent of the gills and siphonal septum; that in *Euciroa* and *Callocardia* the gills differ in very important characters from those of their nearest relatives, and incidentally that the subdivision of the pelecypods into orders based on differences of the gills alone is unnatural and can not be maintained. A peculiar organ, the opisthopodium, discovered many years ago in *Pholadomya*, by Owen, is shown to exist also in *Halicardia*, and is suitably illustrated.

DEWEY, LYSTER H. Tumble mustard.

Bull. Torrey Botan. Club, No. 22, Aug. 31, 1895, p. 370.

Note on the distribution of *Sisymbrium altissimum*.

—— Table of one hundred weeds.

Yearbook U. S. Dept. Agric., 1894 (Sept. 13, 1895), pp. 581–586.

A table is given showing the common and technical names and certain characteristics of one hundred weeds which are troublesome in the United States, with notes indicating methods of eradication.

—— *Laphamia ciliata*, sp. nov.

Botan. Gaz., XX, Sept. 25, 1895, p. 425.

Description of a new species of *Laphamia* from Arizona.

DEWEY, LYSTER H.—Continued.

Distribution of the Russian Thistle in North America.

Botan. Gaz., XX, Nov. 17, 1895, p. 501, 1 map.

Notes on the rapid dissemination of *Salsola kali tragus*, with map showing its present distribution.

—— *Graminea*.

Contrib. U. S. Nat. Herbarium, III, Nov. 23, 1895, pp. 259–266.

Notes upon the grasses in a collection of plants made by J. H. Sandberg and assistants in northern Idaho in the year 1892.

—— The Russian Thistle.

Circ. Div. Bot., U. S. Dept. Agric., No. 3 (revised edition), Dec. 17, 1895, pp. 1–8, 3 figs.

—— Distribution of Prickly Lettuce in the United States.

Botan. Gaz., XXI, Jan. 16, 1896, pp. 34, 35, 1 map.

Notes on the rapid dissemination of *Lactuca scariola*, with map showing its present distribution.

—— Tumbling mustard, *Sisymbrium altissimum*.

Circ. Div. Bot., U. S. Dept. Agric., No. 3, June 25, 1896, pp. 1–8, 3 figs.

Origin and introduction into America; names and description; related weeds; methods of dissemination; points of danger; warning to South Dakota timothy-seed growers; methods of eradication; complete eradication possible.

—— Two hundred weeds, how to know them, and how to kill them.

Yearbook U. S. Dept. Agric., 1895 (1896), pp. 592–611.

Notes on the eradication of weeds. A table is presented giving the common and technical names of two hundred species, with notes on their origin, distribution, character of flowers, methods of propagation, injurious character, and methods of eradication.

ELLIOT, DANIEL GIRAUD. Descriptions of an apparently new species and subspecies of Ptarmigan from the Aleutian Islands.

Auk, XIII, No. 1, Jan., 1896, pp. 24–29, pl. III.

Lagopus evermanni, from Attu Island, and *L. rupestris townsendi*, from Kyska and Adak Islands, are described.

EVERMANN, BARTON W., and COX, ULYSSES O. The fishes of the Neuse River Basin.

Bull. U. S. Fish Com., XV, 1895 (Mar. 2, 1896), pp. 303–310.

EVERMANN, BARTON W., and KENDALL, WILLIAM C. Description of a new species of Pipefish (*Siphostoma scovelli*) from Corpus Christi, Texas.

Proc. U. S. Nat. Mus., XVIII, No. 1043, Apr. 15, 1896, pp. 113–115.

In this paper a full description of a pipefish allied to *S. affine* of Günther is given, with notes on specimens obtained in Florida waters.

FOX, WILLIAM J. Synopsis of the Bembicini of Boreal America.

Proc. Acad. Nat. Sci. Phila., 1895, pp. 351–374.

The author recognizes five genera in this tribe, and gives synoptical tables for distinguishing the genera and species belonging to each found in our fauna. Two new species, *Monedula tenuicornis* and *M. usitata*, were discovered in the Museum material sent to him.

—— Synopsis of the North American species of *Gorytes*, Latr.

Proc. Acad. Nat. Sci. Phila., 1895, pp. 517–539.

This is a brief synopsis, in tabular form, of our species of *Gorytes*, with descriptions of some new species. Mr. Fox discovered three new species in the Museum material transmitted to him.

GILL, THEODORE. Notes on *Orectolobus* or *Crossorhinus*, a genus of Sharks.

Proc. U. S. Nat. Mus., XVIII, No. 1057, Apr. 15, 1896, pp. 211, 212.

—— Notes on the fishes of the genus *Characinus*.

Proc. U. S. Nat. Mus., XVIII, No. 1058, Apr. 15, 1896, pp. 213–215.

—— On the proper name of the Gunnels or Butter-fishes.

Proc. U. S. Nat. Mus., XVIII, No. 1048, Apr. 23, 1896, pp. 147–151.

—— The differential characters of the Syngnathid and Hippocampid fishes.

Proc. U. S. Nat. Mus., XVIII, No. 1049, Apr. 23, 1896, pp. 153–159.

—— Notes on the synonymy of the Torpedinidæ or Narcobatidæ.

Proc. U. S. Nat. Mus., XVIII, No. 1050, Apr. 23, 1896, pp. 161–165.

—— The families of the Synentognathous fishes and their nomenclature.

Proc. U. S. Nat. Mus., XVIII, No. 1051, Apr. 23, 1896, pp. 167–178.

—— On the application of the name *Teuthis* to a genus of fishes.

Proc. U. S. Nat. Mus., XVIII, No. 1052, Apr. 23, 1896, pp. 179–189.

GILL, THEODORE—Continued.

Notes on the nomenclature of *Scymnus* or *Scymnorhinus*, a genus of Sharks.

Proc. U. S. Nat. Mus., XVIII, No. 1053, Apr. 23, 1896, pp. 191–193.

—— Notes on the genus *Cephaleutherus* of Rafinesque, and other rays with aberrant pectoral fins (*Propterygia* and *Hieroptera*).

Proc. U. S. Nat. Mus., XVIII, No. 1054, Apr. 23, 1896, pp. 195–198.

—— Notes on Characinoid fishes with ctenoid scales, with a description of a new *Psectrogaster*.

Proc. U. S. Nat. Mus., XVIII, No. 1055, Apr. 23, 1896, pp. 199–203.

—— The differential characters of Characinoid and Erythrinoid fishes.

Proc. U. S. Nat. Mus., XVIII, No. 1056, Apr. 23, 1896, pp. 205–209.

—— The nomenclature of *Eachicentron* or *Elacate*, a genus of Acanthopterygian fishes.

Proc. U. S. Nat. Mus., XVIII, No. 1059, Apr. 23, 1896, pp. 217–219.

—— Note on the nomenclature of the Pœciloid fishes.

Proc. U. S. Nat. Mus., XVIII, No. 1060, Apr. 23, 1896, pp. 221–224.

—— The nomenclature of the fishes of the Characinoid genus *Tetragonopterus*.

Proc. U. S. Nat. Mus., XVIII, No. 1061, Apr. 23, 1896, pp. 225–227.

—— Note on *Plectroplites* and *Hypoplectrodes*, genera of Serranoid fishes.

Proc. U. S. Nat. Mus., XVIII, No. 1082, June 24, 1896, pp. 567, 568.

GOËS, AXEL. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. Fish Commission steamer *Albatross*, during 1891, Lieut. Commander Z. L. Tanner, U. S. N., commanding. XX.—The Foraminifera.

Bull. Mus. Comp. Zool., XXIX, No. 1, Mar., 1896, pp. 1–103, pls. I–IX and chart.

To facilitate comparison of the Foraminifera from both sides of the Isthmus of Panama, Dr. Goës has included the results of an examination of a series of soundings collected by the U. S. Coast Survey steamer *Blake* and the U. S.

GOËS, Axel—Continued.

Fish Commission steamer *Albatross* in the Gulf of Mexico and Caribbean Sea.

A list of the species found at each station is followed by a systematic account of the species, and a table showing their bathymetrical distribution on both sides of the Isthmus.

GOODE, G. Brown (Editor). Report | of the | United States Commission | to the | Columbian Historical Exposition | at Madrid. | — | 1892–93. | — | With special papers. | — | Washington: | Government Printing Office. | 1895.

8vo, pp. 1–411, with plates and figures.

GOODE, G. Brown. The reception of foreign students into French universities and schools.

Science (New series), III, No. 65, Mar. 27, 1896, pp. 467–470.

—— The Lacoe Collection in the National Museum.

Science (New series), IV, No. 79, July 3, 1896, pp. 8–10.

HARRIS, Gilbert Dennison. The Midway Stage.

Bull. Am. Paleontology, I, No. 4, June 11, 1896, pp. 1–157, pls. 1–15.

This paper, based partly on Museum material, is a monograph of the geology and paleontology of the so-called Midway Stage, or lower division of the Eocene of the southern states. It comprises an historical and stratigraphical account of the formation, followed by descriptions of all the known molluscan fossils belonging to the Midway Stage.

HARTLAUB, C. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. Fish Commission steamer *Albatross*, during 1891, Lieut. Commander Z. L. Tanner, U. S. N., commanding. XVIII.—Die Comatuliden.

Bull. Mus. Comp. Zool., XXVII, No. 4, Aug., 1895, pp. 127–152, pls. I–IV.

Describes seven species of *Antedon*, four of which are new. In an appendix a new species of *Antedon* from Gaspard Strait is described.

Based on material which will be deposited in the Museum.

HASSALL, Albert.

(See under Charles Wardell Stiles.)

HERRICK, Francis Hobart. The American Lobster: A study of its habits and development.

HERRICK, Francis Hobart—Cont'd.

Bull. U. S. Fish Com., 1895, pp. 1–252, pls. A–J and 1–54.

This is an exhaustive monograph. In the chapter on large lobsters several specimens in the National Museum collection are described.

HOLLAND, W. J. List of the Lepidoptera collected in eastern Africa by Dr. W. L. Abbott, with descriptions of some apparently new species.

Proc. U. S. Nat. Mus., XVIII, No. 1062, May 27, 1896, pp. 229–258, pl. VII, figs. 1–14, pl. VIII, figs. 1–4.

The species of Lepidoptera collected by Dr. W. L. Abbott in Masai Land and on Kilima Njaro are enumerated, with references, synonymy, and notes on their distribution and variations. Of butterflies there are ninety-one species, of which six species and one subspecies are described as new. The species of moths number forty-three, of which sixteen species and one genus are new. Nineteen of the new species are figured on the plates.

—— List of the Lepidoptera collected in Somali Land, East Africa, by Mr. William Astor Chanler and Lieutenant von Höhnel.

Proc. U. S. Nat. Mus., XVIII, No. 1063, May 27, 1896, pp. 259–268.

The Lepidoptera collected by the Chanler-Höhnel expedition up Tana River, from the coast to Hameye, embracing forty-three species of butterflies and three species of moths, are here enumerated. Two species of butterflies are described as new.

—— List of the Lepidoptera from Aldabra, Seychelles, and other East African islands, collected by Dr. W. L. Abbott.

Proc. U. S. Nat. Mus., XVIII, No. 1064, May 27, 1896, pp. 265–273, pl. VIII, figs. 6–11.

Eighteen species of butterflies and sixteen species of moths, collected by Dr. W. L. Abbott on the Indian islands north of Madagascar, are here enumerated, with references and notes on their distribution. Of the butterflies, three species are described as new, two from Aldabra and one from Seychelles. One species and one subspecies of the moths are also described for the first time. Six species are figured on the plate.

—— List of the Lepidoptera collected in Kashmir by Dr. W. L. Abbott.

Proc. U. S. Nat. Mus., XVIII, No. 1065, May 27, 1896, pp. 274–278.

An enumeration of twenty-nine species of butterflies and five species of moths, collected in Kashmir. These species were obtained at altitudes varying from one thousand to ten thousand feet.

HOLZINGER, JOHN M. Report on a collection of plants made by J. H. Sandberg and assistants, in northern Idaho in the year 1892.

Contrib. U. S. Nat. Herbarium, III, No. 4, Nov. 23, 1895, pp. 205–287, pls. III, IV.

This report is based upon a collection of one thousand two hundred and seventy-two plants. Seven species are described as new: *Bryum sandbergii*, Holzinger; *Cardamine leibergii*, Holzinger; *Dicranoweisia contermina*, Renauld and Cardot; *Orthotrichium holzingeri*, Renauld and Cardot; *Peucedanum salmoniflorum*, Coulter and Rose; *Peronospora giliæ*, Ellis and Everhart.

The following species are figured: *Cardamine leibergii*, Holzinger; *Viola orbiculata*, Geyer.

HOUGH, WALTER. Catalogue of the ethnological collection of the United States National Museum of the Smithsonian Institution.

Report of the United States Commission to the Columbian Historical Exposition at Madrid, 1892–93 (1895), pp. 143–193.

—— The ancient Central and South American pottery in the Columbian Historical Exposition at Madrid in 1892.

Report of the United States Commission to the Columbian Historical Exposition at Madrid, 1892–93 (1895), pp. 339–365, figs. 1–63.

—— Primitive American armor.

Rep. Smithsonian Inst. (*U. S. Nat. Mus.*), 1893 (1895), pp. 625–651, pls. 1–22, figs. 1–5.

The object of this paper is, first, to present the different types of armor worn by the American Indians, to wit, plate armor, slat armor, stick armor, and skin armor; second, to show the distribution of these different types, both ethnically and geographically.

HOWARD, LELAND O. The beet-leaf Pegomyia.

Insect Life, VII, No. 5, July, 1895, pp. 379–381, 1 fig.

An account of the habits of *Pegomyia vicina*, and the damage which its larva does by mining the leaves of the sugar beet in California.

—— An injurious parasite.

Insect Life, VII, No. 5, July, 1895, pp. 403, 404, 1 fig.

An account of a Chalcidid parasite, infesting the beneficial larva of *Dakruma coccidivora*, which preys upon the injurious scale insect *Pulvinaria innumerabilis*. A new genus and species are erected for the parasite—*Leucodesmia*, n. g., *typica*, n. sp.

HOWARD, LELAND O.—Continued.

—— [Special notes; general notes; notes from correspondents.]

Insect Life, VII, No. 5, July, 1895, pp. 361–364, 411–430.

Forty-four notes, varying in length from three lines to three pages, upon a variety of entomological topics, most of them relating to material now in the National Museum.

—— Some scale insects of the orchard.

Yearbook U. S. Dept. Agric., 1894 (July, 1895), pp. 249–276, 17 figs.

Introductory; life history and habits of scale insects in general; classification; species to be considered; natural enemies; table of parasites; *Mytilaspis pomorum; Chionaspis purpurus; Aspidiotus camelliæ; A. juglansregiæ; A. perniciosus; Diaspis lanatus; Lecanium persicæ; Lecanium prunastri;* remedies for orchard scale; preventives; inspection and quarantine laws.

—— Revision of the Aphelininæ of North America.

Tech. Ser., Div. Ent., U. S. Dept. Agric., No. 1, Sept., 1895, pp. 1–44, 14 figs.

A complete monograph of the North American species of one subfamily of the Chalcid parasitic flies. Introductory chapters treat on the economic importance of this group and their host relations, and a list is also given of the described European species. Analytical tables of the genera and species are presented. Ten genera and twenty-nine species are recognized in our fauna, of which two genera and seven species are here described as new.

—— A new genus and species in the Aphelininæ.

Canadian Entomologist, XXVII, 1895, pp. 350, 351.

Describes *Ameristus ceroplastæ*, from specimens reared from a Ceroplastes on *Euphorbia hypericifolia* in Jamaica, B. W. I., by Dr. M. Grabham.

—— Mosquitoes and fleas.

Circ. Div. Ent., U. S. Dept. Agric., 13 (Series 2), Feb. 1, 1896, pp. 1–4.

—— The Mexican Cotton-boll Weevil (*Anthonomus grandis*, Bop.).

Circ. Div. Ent., U. S. Dept. Agric., 14 (Series 2), Feb. 12, 1896, pp. 1–8, 5 figs.

General appearance and method of work; distribution; natural history and habits; popular names; parasites and natural enemies; remedies.

Spanish edition of same, March, 1896.

—— General work against insects which defoliate shade trees in cities and towns.

Circ. Div. Ent., U. S. Dept. Agric., 15 (Series 2), Mar. 6, 1896, pp. 1–4.

HOWARD, LELAND O.—Continued.

The Grass and Grain Joint-worm Flies and their allies: a consideration of some North American Phytophagic Eurytominæ.

Tech. Ser., Div. Ent., U. S. Dept. Agric., No. 2, Mar., 1896, pp. 1-24, 10 figs.

Treats of the species of Phytophagic Eurytominæ that have been reared and whose life history is known. There are five genera and twenty species, of which fourteen species are described as new.

—— To prevent the growth of beard.

Science (New series), III, No. 74, May 29, 1896, p. 813.

An account, on the authority of Dr. B. F. Egeling, of Monterey, Mexico, of the native superstition that certain cocoons hung around the neck will prevent the growth of beard, and the announcement that the cocoons are those of *Attacus jorulla*, Westw.

—— The shade-tree insect problem in the eastern United States.

Yearbook U. S. Dept. Agric., 1895 (June, 1896), pp. 361-384, 11 figs.

Introductory; *Galerucella luteola: Orgyia leucostigma; Hyphantria cunea;* relative immunity from insects of different varieties of shade trees; general work against shade-tree insects in cities and towns.

—— On two interesting new genera of scale-insect parasites.

Canadian Entomologist, XXVIII, 1896, pp. 165-167.

Reviews the scale-insect parasites other than Encyrtinæ and Aphelininæ, and describes two new pirenine genera and species from New Zealand and Australia.

JOHNSON, CHARLES W. A review of the *Stratiomyia* and *Odontomyia* of North America.

Trans. Am. Ent. Soc., XXII, No. 2, July, 1895, pp. 227-277, pls. III, IV.

A complete monograph of the North American species of the Diptera-genera *Stratiomyia* and *Odontomyia*, partly based on the material in the National Museum. The species are tabulated in analytical keys, all elaborately described, and most of them figured on the plates. Of the genus *Stratiomyia* twenty species are recognized, one of which is described as new, and the original descriptions of seven unrecognized species are added. In the genus *Odontomyia* there are thirty-one valid species, seven of which are described as new, and original descriptions of fifteen unrecognized species are added. The types of three of the new species are in the National Museum.

KENDALL, WILLIAM C.
(See under BARTON W. EVERMANN.)

LEIDY, JOSEPH. Fossil vertebrates from the Alachua clays of Florida.

Trans. Wagner Free Inst. Sci., IV, Jan., 1896, pp. 1-61, pls. I-XIX.

A posthumous paper of Dr. Joseph Leidy, completed and edited by Mr. Frederic A. Lucas, including the identification of most of the species with those previously described. Definite characters are assigned to *Procamelus major* (Leidy) for the first time, and *Rhinoceros proterus*, Leidy, and *R. longipes*, Leidy, are shown to be *Aphelops fossiger* (Cope) and *A. malacorhinus* (Cope).

LINELL, MARTIN L. Description of a new species of Golden Beetle from Costa Rica.

Proc. U. S. Nat. Mus., XVIII, No. 1040, Apr. 23, 1896, pp. 77, 78.

Describes a new species of the Rutelidæ from Costa Rica, and comments on the generic character and on the variety in collections of the golden and silver-colored species of the group.

LUCAS, FREDERIC AUGUSTUS (editor).
(See under JOSEPH LEIDY.)

LUCAS, FREDERIC AUGUSTUS. Notes on the osteology of *Zeuglodon cetoides*.

Am. Naturalist, Aug., 1895, pp. 745, 746.

Describes salient skeletal characters of the species in the light of the material obtained by the U. S. National Museum.

—— Note on Pallas' Cormorant.

Science (New series), II, Nov. 15, 1895, p. 661.

Notes the finding of a skull of this extinct species by Dr. Stejneger.

—— The weapons and wings of birds.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1893 (1895), pp. 653-663, pl. I, figs. 1-8.

Describes the various spurs and callosities on the wings of birds which render them effective as weapons.

—— The deltoid muscle in the Swifts.

Auk, XIII, Jan., 1896, pp. 28, 29.

Reference is made to the variability of this muscle in the group, and special conditions are shown to be characteristic of certain genera.

—— The fossil birds of Patagonia.

Auk, XIII, Jan., 1896, pp. 61-63.

A review of Ameghino's work on the gigantic extinct birds of Patagonia, taking the ground that, while they had no near allies among existing birds, they certainly were not related to the ostriches.

—— Does the private collector make the best museum administrator?

Science (New series), III, Feb. 21, 1896, p. 289.

The author takes the ground that the private collector does not make the best administrative officer.

LUCAS, FREDERIC AUGUSTUS—Cont'd.

Museum methods—The exhibition of fossil vertebrates.

Science (New series), III, Apr. 17, 1896. pp. 573 576.

Discusses the question as to whether vertebrate fossils should be exhibited with skeletons of recent animals, and takes the ground that they should be displayed apart.

—— The taxonomic value of the tongue in birds.

Auk, Apr.,1896, pp. 109–114, 13 figs.

Describes the modifications of the tongue in various species of birds, and considers that they are due to adaptation to food or feeding habits, and are not of value for purposes of classification.

—— Osteological and pterylographical characters of the Procniatidæ.

Proc. U. S. Nat. Mus., XVIII, No. 1077, June 24, 1896, pp. 505–507, figs. 1–5.

Describes the anatomical characters of this new family of birds.

—— The tongues of woodpeckers.

Bull. Div. Ornithology and Mammalogy, U. S. Dept. Agric., No. 7, 1895, pp. 35–39, pls. I–III.

Describes the tongues of various species of North American woodpeckers, and shows the relation between the style of tongue and character of the food.

McGREGOR, R. C. Albinos.

Nidologist, III, No. 9, May, 1896, p. 94.

Notes are offered on seven albino birds collected by the author.

MARLATT, CHARLES L. The Currant Stem-girdler.

Insect Life, VII, No. 5, July, 1895, pp. 387–390, 2 figs.

An account of the early stages of *Phyllœcus flaviventris*.

—— The principal insects of the grape.

Yearbook U. S. Dept. Agric., 1895 (June, 1896), pp. 385–404, 11 figs.

Gives some statistics of the damage to the grape from insects, the life histories and habits of these insects, and the means employed for the extermination of the following species: *Phylloxera vastatrix*, Planch; *Fidia viticida*, Walsh; *Amphicerus bicaudatus*, Say; *Haltica chalybea*, Ill.; *Macrodactylus subspinosus*, Fabr.; *Desmia maculalis*, Westw.; *Philampelus achemon*, Drury; *Agrotis messoria*, Harris; *Agrotis saucia*, Hubn.; *Typhlocyba vitifex*, Fitch: *Eudemis botrana*, Schiff.

—— Revision of the Nematinæ of North America, a subfamily of leaf-feeding

MARLATT, CHARLES L.—Continued.

Hymenoptera of the family Tenthredinidæ.

Tech. Ser. Div. Ent., U. S. Dept. Agric., No. 3, 1896, pp. 1–135.

This is an extended or monographic work on this group (largely based upon Museum material), and a complete revision of the Nematinæ of North America north of Mexico. Synoptical tables of the genera and species are given, and some new genera and many new species are described.

MASON, OTIS TUFTON. Footgear.

Science (New series), III, 1896, p. 598.

This communication draws attention to the fact that the footgear of the American Indians in the areas occupied by the Latin American race in aboriginal times, to wit, Middle and South America, had two toe strings, or a loop inclosing two toes, while in post-Columbian times the type of sandal has come into vogue which was first introduced from Egypt and the Orient into Spain in the eighth century, and from Spain and Portugal imposed upon the American tribes.

—— Bows and arrows of Central Brazil.

Science (New series), III, 1896, pp. 868, 869.

The object of this communication is to draw attention to the work of Dr. Fred. Meyer, and the existence of a long area between the Atlantic slope of the Andes and the Brazilian Highlands where the types of bows and arrows are of a decidedly mixed character, as are also the peoples.

—— Introduction of the Iron Age into America.

Am. Anthropologist, IX, 1896, pp. 191–215.

This paper calls attention to the profound impression made upon the American aborigines from the very first by the importation into their country, in large numbers, of the common mechanics and laborers of Europe, as well as of slaves from Africa. Vestiges of African arts, and of the folk arts of Europe in the fifteenth and sixteenth centuries, cropped out in many places, and frequently these arts are confounded with those of the aborigines.

—— Comparison of the Zuñi with the Finnish belt-weaving apparatus.

Globus, Braunschweig, LXIX, 1896, pp. 12–14, 2 illus.

This paper calls attention to the identity of the heddle used by the Zuñi Indians in weaving their garters and belts and the apparatus used by the Finns in northwestern Russia for the same purpose, and maintains that this likeness is not due to the similar causes operating under similar circumstances, but that in it we have a good example of acculturation.

MEARNS, EDGAR A. Description of a new Heron (*Ardea virescens anthonyi*) from the arid region of the interior of North America.

Auk, XII, No. 3, July, 1895, pp. 257-259.
Ardea virescens anthonyi is described.

—— Preliminary diagnoses of new mammals from the Mexican border of the United States.

Proc. U. S. Nat. Mus., XVIII, No. 1075, pp. 443-447. Advance edition Mar. 25, 1896.

—— Preliminary diagnoses of new mammals from the Mexican border of the United States.

Proc. U. S. Nat. Mus., XIX, No. 1103, May 25, 1896, pp. [1]-[4]. Advance edition.

—— Preliminary description of a new subgenus and six new species and subspecies of Hares, from the Mexican border of the United States.

Proc. U. S. Nat. Mus., XVIII, No. 1081, June 24, 1896, pp. 551-565.

MEEK, SETH E. A list of fishes and mollusks collected in Arkansas and Indian Territory in 1894.

Bull. U. S. Fish Com. XV, 1895 (Apr. 13, 1896), pp. 341-349.

MERCER, HENRY C. Chipped stone implements at the Columbian Historical Exposition at Madrid.

Report of the United States Commission to the Columbian Historical Exposition at Madrid, 1892-93 (1895), pp. 367-397, pls. I-III, figs. 1-27.

MERRILL, GEORGE PERKINS. The onyx marbles: Their origin, composition and uses, both ancient and modern.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1893 (1895), pp. 539-585, pls. 1-18.

—— Directions for collecting rocks and for the preparation of thin sections.

Bull. U. S. Nat. Mus., No. 39, Part I, 1895, pp. [1]-[15], figs. 1-17.

—— Notes on asbestos and asbestiform minerals.

Proc. U. S. Nat. Mus., XVIII, No. 1066, Apr. 23, 1896. pp. 281-292.

Shows that the material commercially included under the name asbestos belongs to four independent mineral species, viz: (1) True asbestos (Tremolite), (2) Anthophyllite, (3) Serpentine, and (4) Crocidolite. It is suggested that the fibrous structure is due to shearing.

MERRILL, GEORGE PERKINS—Cont'd.

An occurrence of free gold in granite.

Am. Journ. Sci., I, Apr., 1896, pp. 309-311.
Briefly describes what is apparently a normal granite from Sonora, Mexico, containing particles of metallic gold embedded in both quartz and feldspar.

—— Disintegration and decomposition of diabase at Medford, Mass.

Bull. Geol. Soc. America, VII, 1896, pp. 349-362, 1 pl.

MILLER, GERRIT S., Jr. Description of a new Jay from Mexico.

Auk, XIII, No. 1, Jan., 1896, pp. 34-37, 1 fig.
Aphelocoma gracilis, from Jalisco, Mexico, is described, and illustrated with a text figure.

MORSE, EDWARD S. If public libraries, why not public museums?

Rep. Smithsonian Inst. (*U. S. Nat. Mus.*), 1893 (1895), pp. 769-780.

MÜLLER, G. W. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. Fish Commission steamer *Albatross* during 1891, Lieut. Commander Z. L. Tanner, U. S. N., commanding. XIX.—Die Ostracoden.

Bull. Mus. Comp. Zool., XXVII, No. 5, Oct., 1895, pp. 155-169, pls. I-III.
Gives detailed descriptions of one new genus and three new species.
Based on material which will be turned over to the Museum.

OBERHOLSER, HARRY C. Descriptions of two new subspecies of the Downy Woodpecker, *Dryobates pubescens* (Linnæus).

Proc. U. S. Nat. Mus., XVIII, No. 1080, June 24, 1896, pp 547-550.
The name *Dryobates pubescens meridionalis*, Swainson, is found applicable for the form of Downy Woodpecker inhabiting the Gulf States of the United States, while the form occurring in Alaska is described as new under the name *Dryobates pubescens nelsoni*. Descriptions, comparisons, and tables of measurements of these forms are added.

PALMER, WILLIAM. On the Florida Ground Owl, *Speotyto floridana*.

Auk, XIII, No. 2, Apr., 1896, pp. 99-108, pl. II.
An account of the habits of this species as observed by the writer.

PERGANDE, THEODOR. Observations on certain Thripidæ.

Insect Life, VII, No. 5, July, 1895, pp. 390–395.

Descriptions of three new species of Thripidæ, accounts of their habits, and some consideration of two previously described species.

PILSBRY, HENRY A. A remarkable Central American Melanian.

Proc. Acad. Nat. Sci. Phila., 1896, pp. 269, 270.

This is a description of a remarkable species of *Pachycheilus* in which the adult has the outer lip sinuous, somewhat as in *Melanatria*. The types from the Tehuantepec region are in the National Museum.

POLLARD, CHARLES LOUIS. Notes on some southern Cassias.

Bull. Torrey Botan. Club, XXII, Dec. 30, 1895, pp. 513–516, pls. 250–252.

Describes and figures *C. multipinnata* and *C. depressa*, new species, and gives key to the Chamæcristoid Cassias of the South.

—— *Viola sagittata hicksii*, var. nov.

Botan. Gaz., XX, July 15, 1895, p. 326.

Describes a new variety of *Viola sagittata* from the District of Columbia.

—— Some new or rare plants.

Botan. Gaz., XXI, Apr. 25, 1896, pp, 232–235.

Describes *Phaseolus smilacifolius* as new; cites additional localities for *Rhamnus frangula* and *Cassia multipinnata nashii;* notes the further occurrence of *Phaclia covillei*, *Perilla frutescens*, and *Limnanthemum nymphæoides* in the District flora.

—— The purple-flowered, stemless violets of the Atlantic Coast.

Proc. Biol. Soc. Wash., X, May 26, 1896, pp. 85–92.

A general discussion of the eastern acaules cent purple flowered violets, with a key to the species. *V. ovata*, Nutt., *V. dentata*, Pursh *V. villosa*, Walt., and *V. septemloba*, LeConte are here restored to specific rank, while *V. sagittata hicksii* is made a variety of *V. ovata*.

RICHMOND, CHARLES W. *Helminthophila leucobronchialis* in Maryland.

Auk, XII, No. 3, July, 1895, p. 307.

This warbler is recorded from Beltville, Md., from a specimen in the National Museum collected by Mr. A. H. Thayer.

—— Descriptions of three new birds from the Island of Margarita, Venezuela.

Auk, XII, No. 4, Oct., 1895, pp. 367–371.

Amazilia aliciæ, *Doleromya pallida*, and *Cardinalis robinsoni* are described as new.

RICHMOND, CHARLES W.—Continued.

Description of a new species of Plover from the east coast of Madagascar.

Proc. Biol. Soc. Wash., X, Mar. 14, 1896, pp. 53, 54.

Ægialitis thoracica is described as new.

—— Catalogue of a collection of birds made by Dr. W. L. Abbott in Kashmir, Baltistan, and Ladak, with notes on some of the species, and a description of a new species of *Cyanecula*.

Proc. U. S. Nat. Mus., XVIII, No. 1078, June 24, 1896, pp. 451–503.

A catalogue of the specimens, seven hundred and forty-six in number, referable to one hundred and eighty-eight species, obtained by Dr. Abbott in Kashmir, Baltistan, and Ladak, accompanied by the collector's notes on colors and measurements. *Cyanecula abbotti* from Nubra Valley, Ladak, is described as new, and critical notes are given on several species.

RIDGWAY, ROBERT. On the correct subspecific names of the Texan and Mexican Screech Owls.

Auk, XII, No. 4, Oct., 1895, pp. 389, 390.

Scops mccallii of Cassin is found to be a synonym of *S. trichopsis*, Wagler; the bird usually designated as *Megascops asio trichopsis* thus not being entitled to that name, is supplied with a new one, viz: *Megascops asio cineraceus*.

—— *Junco phæonotus*, Wagler, not *J. cinereus* (Swainson).

Auk, XII, No. 4, Oct., 1895, p. 391.

The *Fringilla cinerea* of Swainson being preoccupied, it is here found necessary to use the name *Junco phæonotus*, Wagler, in its stead, for the Mexican *Junco* and its subspecies.

—— On Fisher's Petrel (*Æstrelata fisheri*).

Auk, XII, No. 4, Oct., 1895, pp. 319-322, pl. IV.

A description and synonomy of this species is given, accompanied by a colored plate.

—— Nesting of the Duck Hawk in trees.

Nidologist, III, Nos. 4 and 5, Dec., 1895, pp. 42, 43.

An account of the nesting of a pair of Duck Hawks in trees near Mount Carmel, Ill.

—— Description of a new species of Ground Warbler from eastern Mexico.

Proc. U. S. Nat. Mus., XVIII, No. 1045, Apr. 15, 1896, pp. 119, 120.

Geothlypis flavovelatus, from Alta Mira, Tamaulipas, is described.

—— Preliminary descriptions of some new birds from the Galapagos Archipelago.

RIDGWAY, ROBERT—Continued.

Proc. U. S. Nat. Mus., XVIII, No. 1067, Apr. 23, 1896, pp. 293, 294.

Geospiza pachyrhyncha (Tower Island), *Geospiza fatigata* (Indefatigable Island), *Camarhynchus bindloei* (Bindloe Island), *Camarhynchus compressirostris* (Jervis Island), and *Camarhynchus incertus* (James Island) are described.

—— Description of a new subspecies of the genus *Peucedramus*, Coues.

Proc. U. S. Nat. Mus., XVIII, No. 1074, May 21, 1896, pp. 441.

Peucedramus olivaceus aurantiacus (Chilasco, Vera Paz, Guatemala) is described as a new subspecies.

—— Characters of a new American family of Passerine birds.

Proc. U. S. Nat. Mus., XVIII, No. 1076, June 24, 1896, pp. 449, 450.

A new family, the Procniatidæ, is created for the reception of *Procnias viridis*, heretofore placed in the family Tanagridæ.

—— On birds collected by Dr. W. L. Abbott in the Seychelles, Amirantes, Gloriosa, Assumption, Aldabra, and adjacent islands, with notes on habits, etc., by the collector.

Proc. U. S. Nat. Mus., XVIII, No. 1079, June 24, 1896, pp. 509–546.

Lists of the birds of the following islands are given, accompanied in many cases with notes by the collector: I, Seychelles; II, Amirante group; III, Flat Island; IV, Coëtivy; V, Providence Island; VI, Assumption Island; VII, Gloriosa Island; VIII, Aldabra Island. The name *Turtur abbotti* is proposed for a Turtle Dove inhabiting Mahé, Seychelles, thought to be different from *T. picturatus*, and descriptions of thirteen recently new species and subspecies are added. Several other rare or interesting species are described and remarked upon. An appendix contains a bibliography and a tabulated list of two hundred and twelve species occurring in the various islands near Madagascar. Their status, whether native, introduced, or extinct, and the islands inhabited by them, is indicated.

—— A | Manual | of | North American Birds | By Robert Ridgway. | — | Illustrated by 464 outline drawings of the generic characters. | — | Second edition. | Philadelphia: | J. B. Lippincott Company. | 1896.

8vo, pp. I–XIII, 1–653, pls. I–CXXIV.

All North American species, and many allied ones from extralimital regions are concisely described. In the appendix over ninety species, added to the North American avifauna since the issue of the first edition, are described. The following species and genera are here named for the first time: *Cardinalis cardinalis floridanus*, *Oreospiza*, and *Arremonops*.

ROBERTS, C. H. The species of *Dineutes* of America, north of Mexico.

Trans. Am. Ent. Soc., XXII, No. 3, July, 1895, pp. 279–288, pls. V, VI.

A monograph of the North American species of aquatic beetles of the genus *Dineutes*. Twelve species are recognized as valid, three of which are described as new. The types are in the National Museum. The male genitalia and the secondary sexual characters of the anterior legs and of the apices of elytra are figured on the plates.

ROCKHILL, WILLIAM WOODVILLE. Notes on the ethnology of Tibet.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1893 (1895), pp. 665–747, pls. 1–52.

ROSE, JOSEPH NELSON. A yellow-flowered Cosmos.

Garden and Forest, VIII, No. 406, Dec. 4, 1895, p. 484, pl. 66.

A short account of the rediscovery of a very fine yellow Cosmos.

—— Description of plants, mostly new, from Mexico and the United States.

Contrib. U. S. Nat. Herbarium, III, No. 5, Dec. 14, 1895, pp. 311–323, pls. XI–XVI.

This paper consists mostly of descriptions of new species by Dr. Rose, Mr. E. G. Baker of the British Museum, and Prof. Alfred Cogniaux of Verviers, Belgium. The following species are figured: *Mimosa spirocarpa*, Rose; *Ligusticum verticillatum* (Hook.) Coult. and Rose; *Ligusticum eastwoodæ*, Coult. and Rose; *Velæa glauca*, Coult. and Rose; *Thurovia triflora*, Rose; *Tradescantia brevifolia* (Torr.) Rose.

—— *Arracacia filiformis*, Coulter and Rose.

Hooker's Icon. Plant., V, pt. 2, Jan., 1896, pl. 2429.

A technical description, with note by D. Oliver of the Royal Botanic Gardens, Kew, England.

—— Notes upon *Tradescantia micrantha*.

Botan. Gaz., XXI, No. 5, May, 1896, pp. 301, 302, pl. XX.

A short note regarding the rediscovery and cultivation of a Spiderwort from Texas.

(See also under JOHN M. COULTER.)

RYDBERG, P. A. Flora of the sand hills of Nebraska.

Contrib. U. S. Nat. Herbarium, III, No. 3, Sept. 14, 1895, pp. 133–200, 2 pls. and 1 fig.

A catalogue is given of the species collected by Mr. Rydberg in 1893, together with a short account of the floral districts, topography, and climatic conditions of the region.

—— The flora of the Black Hills of Dakota.

RYDBERG, P. A.—Continued.

Contrib. U. S. Nat. Herbarium, III, No. 8, June 13, 1896, pp. 463–536.

Mr. Rydberg gives not only a catalogue of the species which he collected in the Black Hills in 1892, but also some account of the geography, the geology, and the floral districts.

SAUNDERS, HOWARD, and SALVIN, OSBERT. Catalogue | of the | Gaviæ and Tubinares | in the | collection | of the | British Museum. | — | Gaviæ | (Terns, Gulls, and Skuas) | By | Howard Saunders. | Tubinares | (Petrels and Albatrosses) | By | Osbert Salvin. | London: | Printed by order of the Trustees. | * * * | 1896.

8vo, pp. I–XV, 1–475, pls. I–VIII.

This volume constitutes No. XXV of the Catalogue of the Birds in the British Museum. Descriptions of all the species, synonymy, and lists of the specimens in the British Museum are given. The portion devoted to the Tubinares is based partly upon material in the U. S. National Museum.

SCHUCHERT, CHARLES. Directions for collecting and preparing fossils.

Bull. U. S. Nat. Mus., No. 39, Part K, 1895, pp. [1]–[31], figs. 1–13.

This paper treats of the conditions under which fossils are found, the apparatus required, and methods of collecting and packing fossils; also the methods employed in the preparation of fossils for study. A list is added giving some important localities for fossils in North America.

—— Museum methods. On the arrangement of great paleontological collections.

Science (New series), III, No. 68, Apr. 17, 1896, pp. 576–579.

—— Dry dredging in the Mississippian Sea.

Science (New series), II, 1895, pp. 679–681.

An account of a collecting tour through New York, Ontario, and Michigan.

—— American fossil Brachiopoda.

Science (New series), II, 1895, pp. 722–724.

This is a short summary of a work entitled "A Synopsis of American fossil Brachiopoda, including Bibliography and Synonymy," to be published by the U. S. Geological Survey.

SHUFELDT, ROBERT W. The Black Skimmer.

Popular Science News, XXIX, No. 7, New York, July, 1895, pp. 93–100.

A popular account of the birds known as skimmers, of which three species are recognized, all belonging to the genus *Rynchops*.

SHUFELDT, ROBERT W.—Continued.

The article is illustrated by a pen drawing, being a reduced copy, by the author, of Audubon's colored plate of the Black Skimmer, *R. niger*.

—— [Review of] Birdcraft. A field book of two hundred song, game, and water birds. By Mabel Osgood Wright. With full-page plates, containing one hundred and twenty-eight birds in the natural colors, and other illustrations. Pp. I–XVI, 1–317. Macmillan & Co., New York, July, 1895.

Nidiologist, II, No. 11, New York, July, 1895, p. 159.

—— [Review of] The Auk, July, 1895.

Nidiologist, II, No. 12, New York, Aug., 1895, p. 172.

—— [Review of] California Water Birds, [etc.]. By Leverett M. Loomis. *Proc. Cal. Acad. Sci.* (Series 2), V, June 19, 1895, pp. 177–224.

Nidiologist, II, No. 12, New York, Aug., 1895, p. 172.

—— [Review of] Ornis. Internat. Zeits. für die gesammte Ornithol., etc. Herausgegeben von Professor Dr. R. Blasius, VIII Jahrgang. Heft I and II. Braunschweig, 1895, pp. 1–211.

Nidiologist, II, No. 12, New York, Aug., 1895, p. 171.

—— The Long-tailed Jaeger.

Popular Science News, XXIX, No. 8, New York, Aug., 1895, p. 115.

This is a brief article, describing the habits of the birds called Jaegers, of the genera *Megalestris* and *Stercorarius*. Attention is called to the fine series of these birds on exhibition in the ornithological department of the National Museum; and the article is illustrated by a good figure of the long-tailed Jaeger, drawn by the author and reduced from Audubon's colored plate.

—— [Review of] Game birds at home. By Theodore S. Van Dyke. New York: Fords, Howard & Hulbert, 1895. 16 mo, pp. 1–219.

Nidiologist, III, No. 1, New York, Sept., 1895, p. 11.

—— Terns.

Popular Science News, XXIX, No. 9, New York, Sept., 1895, p. 131.

Contains a short description of the life habits of several of these birds, and is illustrated by a figure of the head of a specimen of Trudeau's Tern (natural size).

SHUFELDT, ROBERT W.—Continued.

Photographs of living birds: Aiken's Owl, and Wood Pewee.

Nidiologist, III, No. 2, New York, Oct., 1895, pp. 13–15.

Gives experiences in the matter of the photography of living birds, the article being illustrated by half-tone pictures of a pair of Aiken's Screech Owls, *Megascops a. aikeni*, captured by the author at Fort Wingate, N. Mex. It is probable that this is the first photograph of this species ever published. In the photograph of the young Wood Pewees, *Contopus virens*, both the birds and nest are given natural size, and this print has been very widely copied and republished. It has likewise been adopted as the outside-cover illumination of the *Nidiologist*.

—— [Reviews of the following papers:] On the hyoid bone in certain parrots, by St. George Mivart, *Proc. Zool. Soc. Lond.*, Mar., 1895, pp. 162–174; Hawks and owls from the standpoint of the farmer, by A. K. Fisher, reprinted from the *Yearbook of the U. S. Dept. Agric.*, 1894 (1895), pp. 215–232; a revision of the genus *Turdinus* and genera allied to it, by J. Buttikofer, 42 pp.; The Cowbirds, by Charles Bendire, *Rep. Smithsonian Inst.* (*U. S. Nat. Mus.*), 1893 (1895), pp. 587-614, pls. 1–3; The tongues of Woodpeckers, by F. A. Lucas, reprinted from *Bull. Div. Ornithol. and Mamm., U. S. Dept. Agric.*, No. 7, 1895, pp. 25–39, pls. I–III; The weapons and wings of birds, by F. A. Lucas, *Rep. Smithsonian Inst.* (*U. S. Nat. Mus.*), 1893 (1895), pp. 653–663, pl. 1, figs. 1–8.

Nidiologist, III, No. 2, New York, Oct., 1895, pp. 22, 23.

—— Sea Horses.

Popular Science News (twenty-ninth year), No. II, New York, Nov., 1895, pp. 1, 61, 3 figs.

A somewhat full account of various species of Sea Horses from different parts of the world. Illustrations are given from the works of Dr. G. Brown Goode, Dr. Günther, and Mr. Lockwood.

—— Photographs of young Skimmers, with notes on the breeding habits of these birds, by Mr. William Palmer.

Nidiologist, III, No. 3, New York, Nov., 1895, pp. 26–29, 2 figs.

On the 18th of September, 1895, Mr. William Palmer, of the United States National Museum, loaned the author two living specimens of the young of the Black Skimmer, *Rhynchops nigra*. These birds had been captured by Mr. Palmer on the sandy islands known as "The Isaacs," which are situated a mile or so to the eastward of Cape Charles, Virginia.

The article incorporates Mr. Palmer's notes on the habits of the Skimmers on their breeding grounds, and is illustrated by two fine half-tone figures of the young of this species at different ages. These latter are from photographs made by Dr. Shufeldt from the living birds captured by Mr. Palmer.

—— [Reviews of the following works:] Inmates of my house and garden, by Eliza Brightwen, New York and London, 1895, pp. 1–277; Nature in Acadie, by H. K. Swann, London, 1895, pp. I–VIII, 1–74; The skeleton of *Lorius flavopalliatus* compared with that of *Psittacus erithacus* (part 1), by St. George Mivart, *Proc. Zool. Soc. Lond.*, Apr. 2, 1895, pp. 312–337, 363–399; Further notes on Trinidad birds, with a description of a new species of *Synallaxis*, by F. M. Chapman, *Bull. Amer. Mus. Nat. Hist.*, VII, Art. IX, New York, Oct. 7, 1895, pp. 321–326.

Nidiologist, III, No. 3, New York, Nov., 1895, pp. 33–35.

—— Bluebirds near Washington, D. C.

Forest and Stream, Rod and Gun, XLV, No. 26, New York, Dec. 28, 1895, p. 562.

Points out that *Sialia sialis* is more abundant about Washington than many eastern ornithologists, who have in their writings predicted the complete extinction of the species, would have their readers believe.

—— [Reviews of the following works:] A naturalist in Mexico, by Frank Collins Baker, sm. 8vo, pp. 1–145, Chicago, 1895; Vogelschutz in England, by Paul Leverkühn, Sonderabdruck aus der *Ornithol. Monatsschrift des Deutschen Vereins zum Schutze der Vogelwelt*, Jahrg. 1894, Nr. I, II, Halle, 1895; Todesanzeigen, by Paul Leverkühn, Ibid., VIII, IX, Jahrg. 1895; Birds from Cocos and Malpelo Islands, with notes on Petrels obtained at Sea, by C. H. Townsend, *Bull. Mus. Comp. Zool. Harvard Coll.*, XXVII, No. 3, July, 1895, Art. XVVII, pp. 121–126.

Nidiologist, III, Nos. 4 and 5, New York, Dec., 1895, pp. 53–55.

—— Facts about squirrels.

Am. Field, XLV, No. 4, New York and Chicago, Jan. 25, 1896, p. 80.

SHUFELDT, ROBERT W.—Continued.

There is a widespread zoological myth entertained by the hunters and sportsmen of the United States, to the effect that male squirrels habitually castrate each other at the season of the rut. This myth finds its origin in the demand of the ignorant for some explanation to account for the disappearance of the testes in the Sciuridæ after the breeding season is over. This brief article gives the true explanation of the physiology of these organs in the Rodentia.

—— The mystery of eels.

Popular Science News, XXX, No. 1, New York, Jan., 1896, pp. 2, 3.

The original title of this contribution read "Eels and their Allies," but without the author's permission the editor changed it to the one here given, and under which the article appeared. It is needless to say there is no "mystery" connected with eels.

The article gives a great deal of general information on the natural history of this group of fishes, rendered in a popular style, and illustrated by a reduced copy of *Anguilla rostrata*, drawn by the author after Goode's figure in his "Fishery Industries of the United States:" Several references are made to the publications of the National Museum.

—— The Moose group in the National Museum.

Shooting and Fishing, IX, No. 19, New York, Feb. 27, 1896, pp. 387–389.

Contains an account of the collecting and mounting of the famous group of Moose in the mammal hall of the U. S. National Museum. The article is illustrated by four half-tones, from photographs, of the various specimens composing the group.

—— More facts about squirrels.

Am. Field, XLV, No. 9, New York and Chicago, Feb. 29, 1896, p. 198.

A further attempt to dispel the ignorance of many hunters throughout the country in the matter of the disappearance of the testes, during the rutting season, in the Sciuridæ.

—— More about animal photography.

Nidologist, III, No. 6, New York, Feb., 1896, pp. 57, 58.

Contains additional information upon the methods of making photographs of living animals, and refers to the remarkable work in this line accomplished by M. Bontan, the European naturalist. The contribution is illustrated by a fine half-tone from a photograph of a living specimen of the young of the "Jack Rabbit," made by Mr. H. W. Nash, of Pueblo, Colo.

—— [Reviews of the following papers:] Birds of Narberth, Pa., and vicinity, by W. E. Rotzell, 8vo, pp. 1–8, 1895;

SHUFELDT, ROBERT W.—Continued.

A list of the birds of Maryland, by F. C. Kirkwood, reprint from *Trans. Md. Acad. Sci.*, 1895, pp. 241–382; Bulletin of the British Ornithologists' Club, XXX, Nov., 1895.

Nidologist, III, No. 6, New York, Feb., 1896, p. 67.

—— Some account of spiders.

Great Divide, XIV, No. 2, Chicago, Feb., 1896, pp. 28, 29.

This paper gives considerable general information about the Arachnidæ and some allies of the family. It is illustrated by a half-tone from a photograph by Dr. Shufeldt of a specimen of *Dolomedes tenebrosus* carrying her young in a silken ball. It is natural size, and was taken from the living spider. Another figure, from a drawing by the author, gives a life-size representation of the "Whip-tailed Scorpion," *Thelyphonus giganteus*, from a specimen collected in New Mexico. Both of the specimens are now in the collections of the U. S. National Museum.

—— The American Box-tortoise.

Forest and Stream, XLVI, No. 10, New York, Mar. 7, 1896, pp. 194, 195.

The natural history of *Cistudo carolina* is given, and the article is illustrated by a half-tone figure, nearly natural size, from a photograph of a living specimen of a tortoise of this species. Notes on the breeding habits are added, and reference is made to the ability of this reptile to swim when compelled to by force of circumstances.

—— Shedding of antelope horns.

Shooting and Fishing, XIX, No. 21, New York, Mar. 12, 1896, p. 429.

A reply to Captain Cusick, of the U. S. Army, pointing out his error in entertaining the idea that *Antilocapra* does not shed its horns.

—— The American Partridges.

Shooting and Fishing, XIX, No. 23, New York, Mar. 26, 1896, p. 466.

Running descriptions of the American representatives of the subfamily Perdicinæ, with their breeding habits and geographical ranges. The article is based upon the material in the U. S. National Museum and the standard publications on the subject, including the author's own writings and observations. The article is illustrated by a half-tone figure, nearly life size, of the Massena Partridge, *Cyrtonyx montezumæ*, from a specimen in the Museum.

—— The chimneys of Burrowing Crayfish.

Observer, VII, No. 3, Portland, Conn., Mar., 1896, pp. 85–89.

The literature on this subject is reviewed to a considerable extent, and the problem as to whether or not the crayfish builds its "chimney"

SHUFELDT, ROBERT W.—Continued.

or "tower" as a matter of design, or simply to get rid of the earth pellets rolled up during the excavation of its burrow, is discussed.

Dr. Shufeldt agrees with Prof. Ralph S. Tarr in the premises that no design is implied on the part of the crayfish in these structures, and the only intention of the animal is to get rid of the earth balls it brings up while engaged in forming its burrow. Dr. C. C. Abbott holds a converse view. The article is illustrated by a drawing, by Dr. Shufeldt, of the "chimney" of Barton's Crayfish, *C. bartonii robustus*, made from one of his photographs taken near Washington.

—— Sawfish and Rays.

Great Divide, XIV, No. 3, Chicago, Mar., 1896, pp. 48, 49.

More or less full, popular accounts of these fishes, based upon material in the U. S. National Museum and upon Dr. Shufeldt's personal experiences in the southern seas Figures of *Pristis pectinatus*, drawn by the author from Dr. Goode's "Fishery Industries of the United States," and others of *Torpedo occidentalis*, *Raia lævia*, and *Trygon sabina*, are given, all being considerably reduced.

—— [Reviews of the following papers:] On the cranial osteology, classification, and phylogeny of the Dinornithidæ, by T. Jeffery Parker, *Trans. Zool. Soc. Lond.*, XIII, pt. XI, Oct., 1895, pls. LVI–LXII, pp. 373–428; Rep. Com. für den. IIten Internat. Ornithol. Congress, 3, Sect., Anatomie der Vögel, by Max Fürbringer; Ueber die mit dem Visceralskelet verbundenen spinalen Muskeln bei Selachien, by Max Fürbringer, Abdruck aus der *Jenaischen Zeitschrift für Naturwissenschaft*, XXX, N. F. XXIII, pp. 127–135; Die ästhetische Betrachtung der Thiere, by K. Möbius, *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin*, XLV, 1895, pp. 1, 2.

Nidologist, III, No. 7, New York, Mar., 1896, pp. 78, 79.

—— Zoological myths.

Am. Field, XLV, No. 15, New York and Chicago, Apr. 11, 1896, pp. 343, 344.

Still another attempt to dispel some of the existing ignorance in reference to the physiology of the male organs of generation (the testes) in the Sciuridæ. Examples are here given of a number of other zoological fables that receive wide credence among some people.

—— Snowbirds.

Nidologist, III, No. 8, New York, Apr., 1896, pp. 81, 82.

SHUFELDT, ROBERT W.—Continued.

On the number of species and subspecies of the genus *Junco* in the United States, with remarks upon their habits and ranges. This contribution is illustrated by a vignette of a fine mounted pair (male and female) of *Junco hyemalis*, the work of Mr. Harry C. Denslow, formerly one of the taxidermists in the U. S. National Museum.

—— [Reviews of the following papers by J. H. Gurney:] Ornithological notes from Norfolk, reprinted from the *Zoologist* for Mar., 1895, pp. 1–8; Supposed occurrences of the Spotted Sandpiper in Yorkshire, reprinted from the *Zoologist*, Mar., 1895, pp. 311, 312; On the recent abundance of the Little Auk, *Mergulus alle*, Linn., in Norfolk, reprinted from the *Transactions of the Norfolk and Norwich Naturalists' Society*, VI, art. VIII, pp. 67–70; Catalogue of the Birds of Prey (*Accipitres* and *Striges*), with the number of specimens in the Norwich Museum, London, 1894, pp. 1–56.

Nidologist, III, No. 8, New York, Apr., 1896, pp. 89, 90.

—— [Review of] Memoir of the late John Henry Gurney, by Thomas Southwell, reprinted, with some revisions, from the *Transactions of the Norfolk and Norwich Naturalists' Society*, V, p. 156, London, 1896, pp. 1–12.

Nidologist, III, No. 8, New York, Apr., 1896, pp. 89, 90.

—— Some memoranda concerning sharks.

Great Divide, XIV, No. 4, Chicago, Apr., 1896, p. 69.

Based upon personal observations and studies by the author, as well as upon material in the U. S. National Museum. The article is illustrated by figures of the White Shark, *Carcharias*; the Hammer-head Shark, *Zygæna malleus*; and "the oldest existing type of vertebrate" (*Chlamyloselachus anguineus*), a peculiar shark from the Japanese waters, and originally described by Prof. S. Garman, of Harvard College.

—— Antelope horn shedding. Sledge-hammer Science.

Shooting and Fishing, XX, No. 3, New York, May 7, 1896, p. 50.

A further reply to Capt. Cusick, pointing out to him that Audubon was entirely wrong when he claimed that *Antilocapra* did not shed its horns.

—— Notes on the Evening Grosbeaks.

Forest and Stream, XLVI, No. 19, May 9, 1896, p. 373.

SHUFELDT, ROBERT W.—Continued.

Brings up to date our knowledge of the nidification of the two American representatives of the genus *Coccothraustes*, with other interesting matter added. The article is illustrated by a half-tone cut made from a photograph reducing a life-size colored drawing of Dr. Shufeldt's of a pair of adult specimens of the Evening Grosbeak. This drawing has a peculiar history, as stated in the article.

—— A curious boat from the Spice Islands.

Am. Field, XLV, No. 19, New York and Chicago, May 9, 1896, p. 439.

Description of a boat constructed entirely of cloves, and now in possession of Dr. Shufeldt. Illustrated by a half-tone made from a photograph of the object by the author.

—— Tortoises and turtles.

Great Divide, XIV, No. 5, Chicago, May, 1896, pp. 89, 90.

Personal experiences in collecting and studying tortoises, also descriptions of turtles and their habits, with references to specimens in the U. S. National Museum and the British Museum. Illustrated by copies of Günther's figures showing the arrangement of the epidermoid plates in *Testudo pardalis*, a half-tone of *Cistudo carolina* from a photograph by Dr. Shufeldt, and a drawing of the scutes of *Caretta imbricata*.

—— Progress in American ornithology. 1886–1896.

Am. Naturalist, XXX, No. 353, Philadelphia, May, 1896, pp. 357–372.

Essentially an extended criticism of the second edition of the A. O. U. Check-list of North American Birds. Gives, in tabulated form, the additions of birds to the list since the appearance of the first edition, as well as those removed from it. The List of Fossil Birds of North America is similarly dealt with; while finally the matter of the classification adopted is taken in hand, and shown to be, in many instances, antiquated and eminently unnatural.

—— Short talks about shells.

Observer, VII, No. 5 (whole number, No. 77), Portland, Conn., May, 1896, pp. 179–183.

Brief instructions and definitions of terms for the use of young conchologists. The article is illustrated by drawings made by Dr. Shufeldt, one of the Mitre-Shell, *Mitre episcopalis*, and six others showing the various characters of shells. In the course of the article occasion is taken to invite attention to the conchological collections of the U. S. National Museum, and especially to the fine series of shells in the exhibition cases, prepared to show shell structure and shell growth.

—— [Reviews of the following papers:] The changes of plumage in the Dunlin and Sanderling, by Frank M. Chapman, *Bull. Am. Mus. Nat. Hist.*, VIII, art. I, pp. 1–8, New York, Mar., 1896; On the changes of plumage in the Snow Flake, *Plectrophenax nivalis*, by Frank M. Chapman, *Bull. Am. Mus. Nat. Hist.*, VIII, art. II, pp. 9–12, New York, Mar., 1896; Alleged changes of color in the feathers of birds without molting, by J. A. Allen, *Bull. Am. Mus. Nat. Hist.*, VIII, art. III, pp. 13–44, New York, Mar., 1896.

Nidologist, III, No. 9, New York, May 1896, p. 107.

—— Progress in American ornithology, 1886–1895.

Science, (New series). III, No. 75, New York, June 5, 1896, pp. 841, 842.

A rejoinder to Dr. Allen.

—— Life habits of *Phrynosoma*.

Science (New series), III, No. 76, New York, June 12, 1896, pp. 867, 868.

A reference to an article with this title contributed to *Science* by Prof. Charles L. Edwards (in a former issue), pointing out to him that not all the species of *Phrynosoma* are oviparous, as he seems to believe; that *P. douglassii*, at least, is viviparous, as the author knew from his own personal observations and from specimens he had since placed in the U. S. National Museum, collected by himself in New Mexico.

—— Opossums.

Great Divide, XIV, No. 6, Chicago, June, 1896, p. 109.

Brief descriptions of the Opossums and their allies. Illustrated by a large half-tone, showing the fine group of Virginia Opossums and young, mounted by Mr. William Palmer, and now exhibited in the mammal hall of the U. S. National Museum.

—— Frogs and their uses.

Appleton's Popular Science Monthly, XLIX, No. 2, New York, June, 1896, pp. 179–185.

An article inviting attention to the numerous uses frogs are put to, both in the biological laboratories and elsewhere. Between the lines, this is an address to the antivivisectionists, showing how indispensable it is to have the use of living animal forms wherewith to demonstrate biological truths, especially in medicine and physiology. A fine half-tone of *Rana catesbiana*, from a photograph of a living specimen, by the author, illustrates the contribution.

SCHWARZ, E. A. The Hippelates plague in Florida.

Insect Life, VII, No. 5, July, 1895, pp. 374–379, 2 figs.

SCHWARZ, E. A.—Continued.

An account of the annoyance caused to human beings and animals by *Hippelates flavipes*, *H. pusio*, and *H. plebejus* in the southern United States, with notes on geographical distribution, habits, and probable life history.

—— An imported library pest.

Insect Life, VII, No. 5, July, 1895, pp. 396–398, 1 fig.

A consideration of the habits of *Nicobium hirtum*, a Ptinid beetle which has been imported into the United States and has been found to damage books in the southern states.

SIMPSON, CHARLES TORREY. *Pleurocera subulare* in water mains.

Nautilus, IX, No. 4, Aug., 1895, pp. 37, 38.

An account of *Pleurocera subulare*, Lea, a common mollusk of the Mississippi Basin, which was taken by Mr. Charles T. Lewis, of the Hannibal Water Company, Hannibal, Mo., from the water mains of that city, where in many places the dead shells accumulated so as to completely clog the pipes and faucets. Specimens were donated to the National Museum.

—— Description of four new species of Unios from the Staked Plains of Texas.

Proc. U. S. Nat. Mus., XVIII, No. 1072, May 19, 1896, pp. 381–385, figs. 1–5.

This is a description of Unios believed to be Triassic. These four forms exhibit a remarkable diversity in form, sculpture, hinge, and other characters, and indicate that the genus *Unio* had long been established at the time these species were living. Specimens from the type lot and casts from types are in the National Museum collection.

—— The classification and geographical distribution of the pearly fresh water mussels.

Proc. U. S. Nat. Mus., XVIII, No. 1068, May 19, 1896, pp. 295–343, pl. IX.

This paper briefly reviews the history of the classification of the Naiades, and proposes a new one in part, based on all the characters, but more especially on those of the hinge and embryos. Those genera which have taxodont teeth or vestiges of them, and pass through a larval stage called "lasidium," are placed in the family Mutelidæ, while those having schizodont teeth or their vestiges, and which pass through a glochidium stage, are classified under the Unionidæ, and the families and genera are defined.

It is held that the Naiades are distributed in eight regions or provinces, viz: Ethiopian, Palearctic, Oriental, and Australian in the Old World; a part of the Palearctic region, the Mississippi, Atlantic, Central American, and Neotropical provinces in the New World.

SIMPSON, CHARLES TORREY—Cont'd.

On the Mississippi Valley Unionidæ found in the St. Lawrence and Atlantic drainage areas.

Am. Naturalist, XXX, No. 353, May 20, 1896, pp. 379–384.

This paper shows that the extralimital Mississippi Valley Unionidæ found in the St. Lawrence Basin are usually dwarfed and dull colored, and the claim is made that many of the so-called species of the latter region are merely depauperate varieties of well-known Mississippi Valley forms which have become changed since they have occupied the waters they now inhabit. The theory is advanced that these species migrated northward at the close of the glacial epoch, by way of old streams that flowed from lakes in the north into the Mississippi Valley at that time, as the ice cap to the north and northeast prevented drainage to the north and east.

SPRAGUE, U. A. The Dwarf Thrush in Colorado.

Auk, XIII, No. 1, Jan., 1896, p. 85.

The species is recorded from Colorado, based on a specimen shot near Boulder.

STANTON, TIMOTHY WILLIAM. Contributions to the Cretaceous Paleontology of the Pacific Coast. The fauna of the Knoxville beds.

Bull. U. S. Geol. Surv., No. 133, 1895 (Feb. 3, 1896), pp. 1–132, pls. 1–20.

This monograph is an extended treatise on the fossil animals found in the Knoxville beds, the local development of this horizon along the Pacific Coast, and the relationship of this fauna with other faunas. It is based almost entirely upon material gathered by the U. S. Geological Survey, and now in the U. S. National Museum collection.

STEJNEGER, LEONHARD. Aleut Baidarkas in Kamchatka.

Science (New series), II, July 19, 1895, pp. 62, 63.

A correction of certain statements by Dr. Guillemard in his "Cruise of the Marchesa," concerning some baidarkas alleged to be of Kurile origin.

—— The poisonous snakes of North America.

Rep. Smithsonian Inst. (*U. S. Nat. Mus.*), 1893 (1895), pp. 337–487, pls. 1–19, figs. 1–70.

A popular scientific treatise on our poisonous snakes, with general reference to their anatomy, physiology, morphology, and habits.

—— Description of a new genus and species of Blind Tailed Batrachian from the subterranean waters of Texas.

Proc. U. S. Nat. Mus., XVIII, No. 1088, Apr. 15, 1896, pp. [1]–[3]. Advance edition.

STEJNEGER, LEONHARD—Continued.

Typhlomolge rathbuni is described as a new genus and species. It is the most remarkable herpetological discovery for many years, as the new genus is only the third one of the batrachian superfamily Proteoideæ.

—— Description of a new species of snake (*Tantilla ciseni*) from California.

Proc. U. S. Nat. Mus., XVIII, No. 1044, Apr. 15, 1896, pp. 117, 118.

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Auk, XII, No. 4, Oct., 1895, pp. 371, 372.

Callipepla gambeli deserticola and *Speotyto cunicularia obscura* are described as new.

STILES, CHARLES WARDELL. Bemerkungen über Parasiten—39: *Pyrosoma, Apiosoma,* und *Piroplasma* Gattungsnamen des Texasfieber parasiten.

Centralbl. f. Bak., Paras. u. Infektionskrank, XVIII, 1895, 1 abt., pp. 282, 283; *Veterinary Magazine*, II, 1895, p. 346.

—— *Spherularia bombi* in America. An animal in which *Prolapsus vaginæ* is normal.

Entomological News, VI, 1895, pp. 248–250, pl. XI.

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C. R. des séances du Troisième Congres Internat. d. Zool., Leyde, 1895, pp. 347–351.

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STILES, CHARLES WARDELL, and HASSALL, ALBERT. Notes on parasites—41: *Cittotænia denticulata* (Rudolphi, 1804) Stiles and Hassall, 1896.

Veterinary Magazine, III, 1896, pp. 6–9; *Centralbl. f. Bak., Paras. u. Infektionskrankt.*, XIX, 1896, pt. 1, pp. 70–72.

—— Notes on parasites—42: Comparison of the type of *D. longissimum v. istomum*, Linstow, 1883, with the type of *D. longissimum corvinum*, Stiles & Hassall, 1894.

Veterinary Magazine, III, 1896, pp. 151–155, figs. 1–4.

—— Notes on parasites—43: The synonymy of *Opisthorchis conus* (Creplin, 1825).

Veterinary Magazine, III, 1896, pp. 156–158.

STILES, CHARLES WARDELL, and HASSALL, ALBERT—Continued.

Notes on parasites—44: *Dicrocœlium lanceatum*, Stiles & Hassall, 1896.

Veterinary Magazine, III, 1896, p. 158.

—— Notes on parasites—45: *Dioctophyme* or *Eustrongylus?*

Veterinary Magazine, III, 1896, pp. 159, 160.

—— Notes on parasites—46: An examination of the type of *Moniezia vogti* (Moniez, 1879) Stiles & Hassall, 1896.

Veterinary Magazine, III, 1896, pp. 160, 161.

—— Notes on parasites—47: On the priority of *Cittotænia*, Riehm, 1881, over *Ctenotænia*, Railliet, 1891.

Veterinary Magazine, III, 1896, p. 407.

STONE, WITMER. A revision of the North American Horned Owls with description of a new subspecies.

Auk, XIII, No. 2, Apr., 1896, pp. 153–156.

The horned owls of North America are briefly treated, and a key to the different forms is given. The name *Bubo subarcticus* of Hoy is found to be a synonym of *Bubo arcticus*, Swainson. A new form is described as *Bubo virginianus occidentalis*, and the name *pacificus* of Cassin is revived for a small, dark-colored form from southern California.

—— The molting of birds, with special reference to the plumages of the smaller land birds of eastern North America.

Proc. Acad. Nat. Sci. Phila., 1896, pt. I, Jan., Feb., and Mar., 1896, pp. 108–167, pls. IV, V, 2 figs.

About one hundred and forty species are treated, and valuable information is given on the subject of molting.

TASSIN, WIRT. Directions for collecting minerals.

Bull. U. S. Nat. Mus., No. 39, Part H, 1895, pp. [1]–[6], figs. 1–8.

TOWNSEND, C. H. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. Fish Commission steamer *Albatross*, during 1891, Lieut. Commander Z. L. Tanner, U. S. N., commanding. XVII.—Birds from Cocos and Malpelo islands, with notes on petrels collected at sea.

Bull. Mus. Comp. Zool., XXVII, No. 3, July, 1895, pp. 121–126, 2 pls.

TOWNSEND, C. H.—Continued.

Six species are enumerated from Cocos Island, of which *Cocornis agassizi* and *Nesotriccus ridgwayi*, both genera and species, are described as new. The rare gull, *Creagrus furcatus*, was found in numbers on Malpelo Island, and four specimens were secured. The five species of petrels obtained at sea include such rare ones as *Oceanodroma cryptoleucura*, *O. melaina*, and *Halocyptena microsoma*.

WILSON, THOMAS. Grooved stone axes.

Archæologist, No. 10, 1895, pp. 153–156, figs. 24–28; No. 11, 1895, pp. 169, 170, figs. 29–32; No. 12, 1895, pp. 187, 188.

Describes and figures the various styles of prehistoric grooved stone axes peculiar to North America.

—— Catalogue of the display from the department of prehistoric anthropology, U. S. National Museum, at the Columbian Historical Exposition at Madrid.

Report of the United States Commission to the Columbian Historical Exposition at Madrid, 1892–93 (1895), pp. 93–142, pls. I–VI, figs. 1–67.

The department of prehistoric anthropology in the National Museum was represented at the Exposicion Historico-Americana by about 5,000 objects, selected from the collections, and intended to present a synopsis of aboriginal industry. The objects were exhibited in nineteen double slope-top cases, which were distributed throughout the main hall assigned to the United States. They were classified, so far as possible, in such a way as to show a series of implements and objects in each case or in each portion of a case. General labels descriptive of the series were printed in Spanish and distributed in their appropriate places. A description of the objects displayed, together with the names assigned to them, the material used, the mode of manufacture, and probable purpose, are set forth in the catalogue.

WILSON, THOMAS—Continued.

—— Age of the Indian race; proofs of the antiquity of the red man in America.

The Sun, New York, Apr. 12, 1896.

The original colony must have been restricted in number and locality. It grew in numbers and spread to other localities, until the Indian population increased to millions, and covered the two continents. This required a long period of time. The original colony must have had but one language, but by extension and separation it acquired new ones, until the number amounted to nearly two hundred.

LIST OF NAMES OF INDIVIDUALS, WITH ADDRESSES, WHOSE WRITINGS ARE INCLUDED IN THE FOREGOING BIBLIOGRAPHY.

ADLER, CYRUS, Librarian, Smithsonian Institution; Honorary Assistant Curator of Oriental Antiquities and Custodian of the Collection of Religious Ceremonial Objects, U. S. National Museum.

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Supplement A.

LIST OF NEW FAMILIES, GENERA, AND SUBGENERA DESCRIBED IN THE PAPERS REFERRED TO IN THE FOREGOING BIBLIOGRAPHY.

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SUPPLEMENT B.

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Telenomus grenadensis. W. H. Ashmead. (Hym.) Chantilly Estate, Balthazar, and Mount Gay Estate, Grenada. *Proc. Zool. Soc. Lond.*, XLVIII, 1895, p. 791.

Telenomus latifrons. W. H. Ashmead. (Hym.) Balthazar, Mount Gay Estate, and St. Georges, Grenada. *Proc. Zool. Soc. Lond.*, XLVIII, 1895, p. 792.

Telenomus longiclavatus. W. H. Ashmead. (Hym.) Balthazar, Grenada. *Proc. Zool. Soc. Lond.*, XLVIII, 1895, p. 792.

Telenomus luteipes. W. H. Ashmead. (Hym.) Balthazar, Chantilly Estate, and St. Johns River, Grenada. *Proc. Zool. Soc. Lond.*, XLVIII, 1895, p. 792.

Telenomus minutissimus. W. H. Ashmead. (Hym.) Trinidad, West Indies. *Journ. Trinidad Field Nat. Club*, Aug., 1895, II, p. 220.

Telenomus nigriclavatus. W. H. Ashmead. (Hym.) Balthazar, Grand Etang, and Mount Gay Estate, Grenada. *Proc. Zool. Soc. Lond.*, XLVIII, 1895, p. 794.

Teracolus aldabrensis. W. J. Holland. (Lep.) Seychelles Islands. *Proc. U. S. Nat. Mus.*, XVIII, No. 1064, May 27, 1896, p. 272, pl. VIII, figs. 7, 8.

Teracotona clara. W. J. Holland. (Lep.) Kilimanjaro, Africa. *Proc. U. S. Nat. Mus.*, XVIII, No. 1062, May 27, 1896, p. 249, pl. VII, fig. 12.

Terebra (Acus) amitra. W. H. Dall. (Moll.) Oligocene, Santo Domingo. *Proc. U. S. Nat. Mus.*, XVIII. No. 1035, Apr. 23, 1896, p. 39.

Terebra (Acus) bipartita, Sby., var. cirrus. W. H. Dall. Oligocene, Santo Domingo. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 38.

Terebra (Acus) bipartita, Sby., var. Oligomitra. W. H. Dall. (Moll.) Oligocene, Santo Domingo. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 38.

Terebra (Acus) bipartita. Sby., var. Spirifera. W. H. Dall. (Moll.) Oligocene, Santo Domingo. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 38.

Terebra (Acus) chipolana. W. H. Dall. (Moll.) Oligocene, Florida. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 39.

Terebra (Acus) curvilineata. W. H. Dall. (Moll.) Miocene, New Jersey. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 36.

Terebra gabbi. W. H. Dall. (Moll.) Oligocene, Santo Domingo. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 34.

Terebra haitensis. W. H. Dall. (Moll.) Oligocene, Santo Domingo. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 35.

Terebra (Hastula) inornata. W. H. Dall. (Moll.) Miocene, New Jersey. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 35.

Terebra (Acus) langdoni. W. H. Dall. (Moll.) Oligocene, Florida. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 39.

Terebra (Acus) langdoni, var. perpunctata. W. H. Dall. Oligocene, Florida. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 39.

Terebra (Acus) sincera. W. H. Dall. (Moll.) Miocene, Maryland. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 37.

Terebratella californica. T. W. Stanton. (Brach.) Tehama County, Cal. *Bull. U. S. Geol. Surv.*, No. 133, 1896, p. 33, pl. 1, figs. 12, 13.

Terebratulina kiiensis. W. H. Dall and H. A. Pilsbry. (Brach.) Northwest Coast of America. *Proc. U. S. Nat. Mus.*, XVII, No. 1032, July 8, 1895, p. 720, pl. XXXII, figs. 8, 9.

Terias mandarinulus. W. J. Holland. (Lep.) Masai Land, Africa. *Proc. U. S. Nat. Mus.*, XVIII, No. 1062, May 27, 1896, p. 242, pl. VII, fig. 5.

Tetramerocera variabilis. W. H. Ashmead. (Hym.) Balthazar and Mount Gay Estate, Grenada. *Proc. Zool. Soc. Lond.*, XLVIII, 1895, p. 778.

Tetrastichus chlamytis.* W. H. Ashmead. (Hym.) Roslyn, Va. *Trans. Am. Ent. Soc.*, XXIII, 1896, p. 233.

Tetrastichus johnsoni. W. H. Ashmead. (Hym.) Urbana, Ill. *Trans. Am. Ent. Soc.*, XXIII, 1896, p. 233.

Tetrastichus microrhopalæ.* W. H. Ashmead. (Hym.) Roslyn, Va. *Trans. Am. Ent. Soc.*, XXIII, 1896, p. 233.

Textularia solita, Schwag, var. inflata. A. Goës. (Foram.) Pacific Ocean. *Bull. Mus. Comp. Zool.*, XXIX, No. 1, Mar., 1896, p. 42, pl. V, figs. 1–3.

Theroscopus americanus. W. H. Ashmead. (Hym.) Arlington, Va. *Trans. Am. Ent. Soc.*, XXIII, 1896 p. 211.

Thersilochus oculatus. W. H. Ashmead. (Hym.) Mount Gay Estate, Grenada. *Proc. Zool. Soc. Lond.*, XLVIII, 1895, p. 779.

Thurammina erinacea. A. Goës. (Foram.) Pacific Ocean. *Bull. Mus. Comp. Zool.*, XXIX, No. 1, Mar., 1896, p. 26, pl. II, figs. 9, 10.

Thurovia triflora. J. N. Rose. (Bot.) Texas. *Contrib. U. S. Nat. Herbarium*, III, No. 5, Dec. 14, 1895, p. 321.

Tornatina fischeri. W. H. Dall. (Moll.) Oligocene, Florida. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 26.

Tornatina (Cylichnella) gabbi. W. H. Dall. (Moll.) Pliocene, Florida. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 27.

Tornatina incisula. W. H. Dall. (Moll.) Oligocene, Florida. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 25.

Tornatina myrmecoön. W. H. Dall. (Moll.) Miocene, North Carolina. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 25.

Tornatina persimilis. W. H. Dall. (Moll.) Oligocene, Florida. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 26.

Tractolira sparta. W. H. Dall. (Moll.) Panama. *Proc. U. S. Nat. Mus.*, XVIII, No. 1034, Apr. 23, 1896, p. 13.

Trichoglenes occidentalis. W. H. Ashmead. (Hym.) Banff Springs, Alberta, Canada; Easton, Wash. *Trans. Am. Ent. Soc.*, XXIII, 1896, p. 225.

Trichopria affinis. W. H. Ashmead. (Hym.) Balthazar, Grenada. *Proc. Zool. Soc. Lond.*, XLVIII, 1895, p. 808.

Trichopria bifoveata. W. H. Ashmead. (Hym.) Balthazar, Grenada. *Proc. Zool. Soc. Lond.*, XLVIII, 1895, p. 808.

Trichopria grenadensis. W. H. Ashmead. (Hym.) Balthazar and Grand Etang, Grenada. *Proc. Zool. Soc. Lond.*, XLVIII, 1895, p. 808.

Triclistus terminalis.* W. H. Ashmead. (Hym.) District of Columbia. *Trans. Am. Ent. Soc.*, XXIII, 1896, p. 201.

Triclistus thoracicus.* W. H. Ashmead. (Hym.) Dixie Landing, Va. *Trans. Am. Ent. Soc.*, XXIII, 1896, p. 201.

Tridax tenuifolia. J. N. Rose. (Bot.) Chihuahua, Mexico. *Contrib. U. S. Nat. Herbarium*, III, No. 5, Dec. 14, 1895, p. 319.

Trybliographa xanthopoda. W. H. Ashmead. (Hym.) Balthazar, Grenada. *Proc. Zool. Soc. Lond.*, XLVIII, 1895, p. 754.

Turbo colusæensis. T. W. Stanton. (Gast.) Near Wilbur Springs, Cal. *Bull. U. S. Geol. Surv.*, No. 133, 1896, p. 6, pl. 12, fig. 14.

Turbo ? humerosus. T. W. Stanton. (Gast.) Near Lowerys, Cal. *Bull. U. S. Geol. Surv.*, No. 133, 1896, p. 67, pl. 12, figs. 10, 11.

Turbo morganensis. T. W. Stanton. (Gast.) Morgan Valley, Lake County, Cal. *Bull. U. S. Geol. Surv.*, No. 133, 1896, p. 66, pl. 12, fig. 13.

Turbo paskentænsis. T. W. Stanton. (Gast.) Near Paskenta, Cal. *Bull. U. S. Geol. Surv.*, No. 133, 1896, p. 64, pl. 12, figs. 5, 6.

Turbo trilineatus. T. W. Stanton. (Gast.) Near Lowerys, Cal. *Bull. U. S. Geol. Surv.*, No. 133, 1896, p. 65, pl. 12, fig. 12.

Turbo wilburensis. T. W. Stanton. (Gast.) Near Wilbur Springs, Cal. *Bull. U. S. Geol. Surv.*, No. 133, 1896, p. 65, pl. 12, fig. 15.

Turritella alcida. W. H. Dall. Oligocene, Florida. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 23.

Turtur abbotti. Robert Ridgway. (Aves.) Mahe, Seychelles. *Proc. U. S. Nat. Mus.*, XVIII, No. 1079, June 24, 1896, p. 513.

Typhlomolge rathbuni. L. Stejneger. (Batrach.) San Marcos, Tex. *Proc. U. S. Nat. Mus.*, XVIII, No. 1088, Apr. 15, 1896, p. 620.

Umbonium (Solariorbis) duplinense. W. H. Dall. (Moll.) Miocene, Florida. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 46.

Umbonium (Solariorbis) floridanum. W. H. Dall. (Moll) Pliocene, Florida. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 45.

Umbonium (Solariorbis) undula. W. H. Dall. (Moll.) Miocene, North Carolina. *Proc. U. S. Nat. Mus.*, XVIII, No. 1035, Apr. 23, 1896, p. 46.

Unio dockumensis. C. T. Simpson. (Moll.) Triassic, Texas. *Proc. U. S. Nat. Mus.*, XVIII, No. 1072, May 20, 1896, p. 384, fig. 5.

Unio dumblei. C. T. Simpson. (Moll.) Triassic, Texas. *Proc. U. S. Nat. Mus.*, XVIII, No. 1072, May 20, 1896, p. 383, fig. 3.

Unio graciliratus. C. T. Simpson. (Moll.) Triassic, Texas. *Proc. U. S. Nat. Mus.*, XVIII, No. 1072, May 20, 1896, p. 384, fig. 4.

Unio mitchelli. C. T. Simpson. (Moll.) New Mexico. *Proc. U. S. Nat. Mus.*, XVIII, No. 1033, Apr. 23, 1896, p. 5.

Unio subplanatus. C. T. Simpson. (Moll.) Triassic, Texas. *Proc. U. S. Nat. Mus.*, XVIII, No. 1072, May 20, 1896, p. 383, figs. 1, 2.

Uriella rufipes. W. H. Ashmead. (Hym.) Algonquin, Ill.; Columbus, Ohio. *Trans. Am. Ent. Soc.*, XXIII, 1896, p. 222.

Ursus emmonsi. W. H. Dall. (Mamm.) Alaska. *Science* (new series), II, No. 30, July 26, 1895, p. 87.

Velæa glauca. J. M. Coulter and J. N. Rose. (Bot.) Oregon. *Contrib. U. S. Nat. Herbarium*, III, No. 5, Dec. 14, 1895, p. 321.

Verneuilina pusilla. A. Goës. (Foram.) Pacific Ocean. *Bull. Mus. Comp. Zool.*, XXIX, No. 1, Mar., 1896, p. 39, pl. v, figs. 6–8.

Verracina rudis. A. Goës. (Foram.) Pacific Ocean. *Bull. Mus. Comp. Zool.*, XXIX, No. 1, Mar., 1896, p. 25, pl. 1, figs. 15, 16.

Viola sagittata hicksii. C. L. Pollard. (Bot.) Washington, D. C. *Botan. Gaz.*, XX, July 15, 1895, p. 326.

Vitrea johnsoni. W. H. Dall. (Moll.) Northwest Coast of America. *Nautilus*, IX, No. 3, July, 1895, p. 27.

Vitrea subrupicola, var. spelæa. W. H. Dall. (Moll.) Cave City, Cal. *Nautilus*, IX, No. 3, July, 1895, p. 27.

Wissadula pringlei. J. N. Rose. (Bot.) Oaxaca, Mexico. *Contrib. U. S. Nat. Herbarium*, III, No. 5, Dec. 14, 1895, p. 312.

Yphthima chanleri. W. J. Holland. (Lep.) Tana River, Africa. *Proc. U. S. Nat. Mus.*, XVIII, No. 1063, May 27, 1896, p. 260.

Xyalaspis flavipes. W. H. Ashmead. (Hym.) Great Falls, Md., and Arlington, Va. *Trans. Am. Ent. Soc.*, XXIII, 1896, p. 183.

APPENDIX V.

Papers Published in Separate Form During the Fiscal Year ending June 30, 1896.

FROM THE REPORT FOR 1893.

Report upon the condition and progress of the U. S. National Museum during the year ending June 30, 1893. By G. Brown Goode. pp. 1–334, pls. 1–59.

The poisonous snakes of North America. By Leonhard Stejneger. pp. 337–487, pls. 1–19, figs. 1–70.

Chinese games with dice and dominoes. By Stewart Culin. pp. 489–537, pls. 1–12, figs. 1–33.

The onyx marbles. By George P. Merrill. pp. 539–585, pls. 1–18.

The Cowbirds. By Maj. Charles Bendire, U. S. Army. pp. 587–624, pls. 1–3.

Primitive american armor. By Walter Hough. pp. 625–651, pls. 1–22, figs. 1–5.

The weapons and wings of birds. By Frederic A. Lucas. pp. 653–663, pl. 1, figs. 1–8.

Notes on the ethnology of Tibet. By William Woodville Rockhill. pp. 665–747, pls. 1–52.

Two Persepolitan casts in the U. S. National Museum. By Cyrus Adler. pp. 749–753, pls. 1, 2.

Museum collections to illustrate religious history and ceremonials. By Cyrus Adler. pp. 755–768.

If public libraries, why not public museums? By Edward S. Morse. pp. 769–780.

FROM BULLETIN 39.

Part H. Directions for collecting minerals. By Wirt Tassin. pp. [1]–[6], figs. 1–8.

Part I. Directions for collecting rocks and for the preparation of thin sections. By George P. Merrill. pp. [1]–[15], figs. 1–17.

Part J. Directions for collecting specimens and information illustrating the aboriginal uses of plants. By Frederick V. Coville. pp. [1]–[8].

Part K. Directions for collecting and preparing fossils. By Charles Schuchert. pp. [1]–[31], figs. 1–13.

FROM PROCEEDINGS VOLUME XVII.

No. 1032. Report on Mollusca and Brachiopoda dredged in deep water, chiefly near the Hawaiian Islands, with illustrations of hitherto unknown species from Northwest America. By William Healey Dall. pp. 675–733, pls. XXIII–XXXIII.

FROM PROCEEDINGS VOLUME XVIII.

No. 1033. Diagnoses of new mollusks from the survey of the Mexican Boundary. By W. H. Dall. pp. 1–6.

No. 1034. Diagnoses of new species of mollusks from the West Coast of America. By W. H. Dall. pp. 7–20.

No. 1035. Diagnoses of new Tertiary fossils from the southern United States. By W. H. Dall. pp. 21–46.

No. 1036. Two new Diplopod Myriapoda of the genus *Oxydesmus* from the Congo. By O. F. Cook. pp. 47–52.

No. 1037. *Priodesmus*, a new genus of Diplopoda from Surinam. By O. F. Cook. pp. 53–57, pl. 1.

No. 1038. On *Geophilus attenuatus*, Say, of the class Chilopoda. By O. F. Cook. pp. 59–62.

No. 1039. An arrangement of the Geophilidæ, a family of Chilopoda. By O. F. Cook. pp. 63–75.

No. 1040. Description of a new species of Golden Beetle from Costa Rica. By Martin L. Linell. pp. 77, 78.

No. 1041. Two new species of beetles of the Tenebrionid genus *Echocerus*. By F. H. Chittenden. pp. 79, 80.

No. 1042. East African Diplopoda of the suborder Polydesmoidea, collected by Mr. William Astor Chanler. By O. F. Cook. pp. 81–111, pls. 2–6.

No. 1043. Description of a new species of Pipefish (*Siphostoma scovelli*) from Corpus Christi, Tex. By Barton W. Evermann and William C. Kendall. pp. 113–115.

No. 1044. Description of a new species of snake (*Tantilla eiseni*) from California. By Leonhard Stejneger. pp. 117, 118.

No. 1045. Description of a new species of Ground Warbler from eastern Mexico. By Robert Ridgway. pp. 119, 120.

No. 1046. East African Odonata, collected by Dr. W. L. Abbott. By Philip P. Calvert. pp. 121–142.

No. 1047. Notes on the Odonata from East Africa, collected by the Chanler Expedition. By Philip P. Calvert. pp. 143–145.

No. 1048. On the proper name of the Gunnels or Butter-fishes. By Theodore Gill. pp. 147–151.

No. 1049. The differential characters of the Syngnathid and Hippocampid fishes. By Theodore Gill. pp. 153–159.

No. 1050. Notes on the synonymy of the Torpedinidæ or Narcobatidæ. By Theodore Gill. pp. 161–165.

No. 1051. The families of Synentognathous fishes and their nomenclature. By Theodore Gill. pp. 167–178.

No. 1052. On the application of the name *Teuthis* to a genus of fishes. By Theodore Gill. pp. 179–189.

No. 1053. Notes on the nomenclature of *Scymnus* or *Scymnorhinus*, a genus of sharks. By Theodore Gill. pp. 191–193.

No. 1054. Notes on the genus *Cephalentherus* of Rafinesque, and other Rays with aberrant pectoral fins (*Propterygia* and *Hieroptera*). By Theodore Gill. pp. 195–198.

No. 1055. Notes on Characinoid fishes with ctenoid scales, with a description of a new *Psectrogaster*. By Theodore Gill. pp. 199–203.

No. 1056. The differential characters of Characinoid and Erythrinoid fishes. By Theodore Gill. pp. 205–209.

No. 1057. Notes on *Orectolobus* or *Crossorhinus*, a genus of sharks. By Theodore Gill. pp. 211, 212.

No. 1058. Note on the fishes of the genus *Characinus*. By Theodore Gill. pp. 213–215.

No. 1059. The nomenclature of *Rachicentron* or *Elacate*, a genus of Acanthopterygian fishes. By Theodore Gill. pp. 217–219.

No. 1060. Note on the nomenclature of the Pœcilioid fishes. By Theodore Gill. pp. 221–224.

No. 1061. The nomenclature of the fishes of the Characinoid genus *Tetragonopterus*. By Theodore Gill. pp. 225–227.

No. 1062. List of the Lepidoptera collected in Eastern Africa by Dr. W. L. Abbott, with descriptions of some apparently new species. By W. J. Holland. pp. 229–258.

No. 1063. List of the Lepidoptera collected in Somaliland, East Africa, by Mr. William Astor Chanler and Lieutenant von Höhnel. By W. J. Holland. pp. 259–264.

No. 1064. List of the Lepidoptera from Aldabra, Seychelles, and other East African islands, collected by Dr. W. L. Abbott. By W. J. Holland. pp. 265–273.

No. 1065. List of the Lepidoptera collected in Kashmir by Dr. W. L. Abbott. By W. J. Holland. pp. 275–279, pls. 7, 8.

No. 1066. Notes on asbestos and asbestiform minerals. By George P. Merrill. pp. 281–292.

No. 1067. Preliminary description of some new birds from the Galapagos Archipelago. By Robert Ridgway. pp. 293, 294.

No. 1068. The classification and geographical distribution of the Pearly Freshwater Mussels. By Charles T. Simpson. pp. 295–343, pl. 9.

No. 1072. Description of four new Triassic Unios from the Staked Plains of Texas. By Charles T. Simpson. pp. 381–385.

No. 1073. Revision of the North American Empidæ, a family of two-winged insects. By D. W. Coquillett. pp. 387–440.

No. 1074. Description of a new subspecies of the genus *Peucedramus*, Coues. By Robert Ridgway. p. 441.

No. 1075. Preliminary diagnoses of new mammals from the Mexican border of the United States. By Edgar A. Mearns. pp. 443–447.

No. 1076. Characters of a new American family of Passerine birds. By Robert Ridgway. pp. 449–450.

No. 1077. Osteological and pterylographical characters of the Procniatidæ. By F. A. Lucas. pp. 505–507.

No. 1078. Catalogue of a collection of birds made by Dr. W. L. Abbott in Kashmir, Baltistan, and Ladak, with notes on some of the species, and a description of a new species of *Cyanecula*. By Charles W. Richmond. pp. 451–503.

No. 1079. On birds collected by Dr. W. L. Abbott in the Seychelles, Amirantes, Gloriosa, Assumption, Aldabra, and adjacent islands, with notes on habits, etc., by the collector. By Robert Ridgway. pp. 509–546.

No. 1080. Descriptions of two new subspecies of the Downy Woodpecker, *Dryobates pubescens*, Linnæus. By Harry C. Oberholser. pp. 547–550.

No. 1081. Preliminary description of a new subgenus and six new species and subspecies of hares, from the Mexican Border of the United States. By Edgar A. Mearns. pp. 551–565.

No. 1082. Note on *Plectroplites* and *Hypoplectrodes*, genera of Serranoid fishes. By Theodore Gill. pp. 567, 568.

No. 1087. Preliminary descriptions of a new genus and two new species of crustaceans from an artesian well at San Marcos, Tex. By James E. Benedict. pp. [1], [2]. (Advance edition.)

No. 1088. Description of a new genus and species of Blind Tailed Batrachian from the subterranean waters of Texas. By Leonhard Stejneger. pp. [1]–[3]. (Advance edition.)

FROM PROCEEDINGS VOLUME XIX.

No. 1103. Preliminary diagnoses of new mammals from the Mexican border of the United States. By Edgar A. Mearns. pp. [1]–[4]. (Advance edition.)

APPENDIX VI.

Specimens Sent to the Museum for Examination and Report.[1]

The following is a complete list of the specimens received for examination and report, arranged alphabetically by names of senders, during the year ending June 30, 1896:

Academy of Natural Sciences, Philadelphia, Pa.—Transmitted by Witmer Stone: Owl. 3479 (II).

Albien, H. A., Custer, S. Dak.: Fuller's earth. (Returned.) 3434 (XIII).

Alexander, Dr. C. L., Charlotte, N. C.: Bird-shaped object. 3315 (XIV).

Alford, Charles, Kenly, N. C.: Stone. (Returned.) 3512 (XIII).

Allen, J. A., American Museum of Natural History, New York: Three birds' skins from South America. (Returned.) 3359 (II).

American Museum of Natural History, New York: Fifty-one birds' skins. (Returned.) 3337, 3420 (II).

Anderson, S. M., Glendale, Utah: Rocks. (Returned.) 3588 (XIII).

Andrews, Dr. E. A., Johns Hopkins University, Baltimore, Md.: Crab. (Returned.) 3455 (VIII).

Andrews, J. E., Gainesville, Fla.: Rock. 3634 (XIII).

Anthony, A. W., San Diego, Cal.: Three birds' skins. 3539, 3614 (II).

Appleton, J. W. M., Salt Sulphur Springs, W. Va.: Ore; supposed coal. 3669 (returned). 3696 (30644) (XIII).

Armstrong, C. J., Wolcott, N. Y.: Supposed meteorite. (Returned.) 3334 (XII).

Arnold, B. W., Palmetto, Fla.: Siliceous sand. (Returned.) 3532 (XIII).

Arnold, H. C., Kenton, Okla.: Ores. (Returned.) 3470 (XIII).

Ashdown, J. H., Manse, Nev.: Mineral. (Returned.) 3743 (XII).

Attwater, H. P., San Antonio, Tex.: Three hundred birds' skins. 3693 (30609) (II).

Avery, Frank B., Savannah, Ga.: Stone implement. (Returned.) 3404 (XIV).

Axe, B. E., Auburn, Wash.: Roots of plants. 3639 (XVII).

Babbitt Brothers, Flagstaff, Ariz.: Rock. 3576 (30408) (XIII).

Bacon, Mrs. Lydia, Nevada, Ohio: Fragments of a supposed meteorite. (Returned.) 3496 (XII).

Baker, Frank C., Chicago Academy of Sciences, Chicago, Ill.: Mollusks. (Returned.) 3760 (VI). (See under Chicago Academy of Sciences.)

Baker Institute, Baldwin, Kans.—Transmitted by Prof. C. S. Parmenter: Insects. (Returned.) 3739 (VII).

Balsley, Dr. T. E., Reidsville, N. C.: Spider. (Returned.) 3312 (VII).

Barnes, W. A., Marshall, Va.: Insect. (Returned.) 3398 (VII).

Bateman, Dr. C. H., Newport, Tenn.: Mineral. (Returned.) 3706 (XII).

Baumgartel, A. G., Holland, Mich.: Head of a duck. (Returned.) 3723 (II).

Beard, D. P., Omaha, Nebr.: Fungus. 3771 (XI).

Beattie, Mrs. Hamlin, Greenville, S. C.: Rocks. (Returned.) 3547, 3582 (XIII).

[1] The first number accompanying the entries in this list is that assigned on the Museum records to sendings "for examination." The number in Roman, in parentheses, indicates the department in the Museum to which the material is referred for examination and report. When material is permanently retained, a number of another series, i. e., the permanent accession record, is placed in parentheses between the two sets of numbers referred to.

BECK, ROLLO H., Berryessa, Cal.: Nine birds' skins. (Returned.) 3265, 3613 (II).

BÉGIN, L'ABBÉ P. A., Séminaire St. Charles-Borromee, Sherbrooke, Canada: North American Coleoptera. (Returned.) 3419 (VII).

BENNETT, MABLE, Cincinnati, Ohio: Coin. (Returned.) 3662 (XVII).

BEYER, G., New York City: Coleoptera. (Returned.) 3510 (VII).

BIEDERMAN, C. R., Bonito, N. Mex.: Carbon inclosed in cleavings of sandstone of the Upper Coal formation. 3252 (XIII).

BILLINGS, WILLIAM, Camden, S. C.: Concretion. (Returned.) 3421 (XIII).

BINKLEY, S. H., Alexandersville, Ohio: Bird-shaped stone; small, cup-shaped stone; natural formation. 3282, 3329 (3382 returned) (XIV).

BINNINGS, H. R., John Adams, Cal.: Eyeless skull found in a gravel bed. 3554 (I).

BIRD, FRANK A., Park City, Utah: Mineral. (Returned.) 3550 (XII).

BISHOP, ALEX., Teges, Ky.: Mineral. (Returned.) 3249 (XII).

BLACHLY, E., Mill Grove, Mo.: Insects. (Returned). 3461 (VII).

BLACKFORD, C. M., Lynchburg, Va.: Minerals. (Returned.) 3620 (XII).

BLAKE, F. A., Rociada, N. Mex.: Minerals. (Returned.) 3716 (XII).

BOND, WARREN R., Custer, S. Dak.: Samples of earth. (Returned.) 3407 (XIII).

BONELLI, G. A., Tooele City, Utah: Root. 3349 (XVII).

BOULDIN, P., Stuart, Va.: Larval case of an insect. (Returned.) 3356 (VII).

BOWERS, M. A., Little Rock, Ark.: Galls of cottonwood tree. 3468 (30068) (VII).

BOWMAN, J. H., Holbrook, Ariz.: Clay. (Returned.) 3681 (XIII).

BRAVERMAN, M., Visalia, Cal.: Ore. (Returned.) 3493 (XIII).

BREED, estate of Dr. Daniel.—Transmitted by Prof. B. T. Janney, Washton, D. C.: Collection of fossils and other material. (Portion returned.) 3477 (balance retained, 30076) (X–B).

BRENINGER, G. F., Phœnix, Ariz.: Four birds' skins. (Returned.) 3656 (II).

BRETTEL, MAX, New York City: Caterpillar. 3295 (VII).

BROCKETT, C. A., Kansas City, Mo.: White clay. (Returned.) 3422 (XII).

BROD, P. W., Phœnix, Ariz.: Insect. (Returned.) 3267 (VII).

BRODNAX, Dr. B. H., Brodnax, La.: Insects; flowers infested with insects. 3642 (returned); 3652 (30557); 3702 (VII).

BROOM, Mrs. C. W., Salt Lake City, Utah: Minerals; stones. (Returned.) 3528, 3515 (XII, XIII).

BROWN, HERBERT, Tucson, Ariz.: Five reptiles. (Returned.) 3676 (IV).

BROWN, H. H., Glenelder, Kans.: Supposed graphite. (Returned.) 3412 (XII).

BROWN, M. F., Pittsburg, Tex.: Insect. (Returned.) 3622 (VII).

BROWN, P. F., Blue Ridge Springs, Va.: Insect. (Returned.) 3251 (VII).

BROWN, R. A., Mount Carmel, Ky.: 83 stone implements. (Returned.) 3577 (XIV).

BRYANT, EDWIN S., Devils Lake, N. Dak.: Bird skin. (Returned.) 3766 (II).

BULL, AMOS, Page, Kans.: Mineral. (Returned.) 3631 (XII).

BURCKHATTER, J. B., Vinita, Ind. T.: Two fragments of stone taken from a supposed petrified human figure. (Returned.) 3728 (IX).

BURKE, EDMUND, Sheridan, Wyo.: Stones. (Returned.) 3659 (XIII).

BRYAN, Dr. C. B., Hampton, Va.: Insect covered with egg cases; mushrooms. 3306, 3362 (VII, XI).

CAFFREY, JAMES, Springville, Utah: Rock. (Returned.) 3505 (XIII).

CALIFORNIA ACADEMY OF SCIENCES, San Francisco, Cal.—Transmitted by L. M. Loomis: Eight birds' skins. 3534 (II).

CALKINS, RAYMOND, Milford, Mich.: Pointed implement of banded slate. (Returned.) 3692 (XIV).

CALL, R. ELLSWORTH, Cincinnati, Ohio: Diptera from Mammoth Cave, Ky. 3633 (30531) (VII).

CALL, S. S., Kingston, N. Mex.: Insect. (Returned.) 3444 (VII).

CARPENTER, A. V., Ophir, Utah: Ore. 3597 (XIII).

CARTWRIGHT, O. E., Detroit, Mich.: Piece of bedticking. 3504 (30616) (XVII).

CHANDLER, E. H., Marietta, Ga.: Worm. (Returned.) 3406 (VII).

CHAPMAN, N. A., Twinsburg, Ohio: Insect-cases. (Returned.) 3688 (VII).

CHICAGO ACADEMY OF SCIENCES, Chicago, Ill.—Transmitted by Frank C. Baker: Shells. 3474 (portion returned, remainder retained, 30132); 3774 (portion returned, remainder retained, 30829) (VI).

CHILDS, Dr. L. B., Detroit, Mich.: Herb. 3469 (XVII).

CHURCHILL, C. H., Elreno, Okla.: Supposed phosphate of lime. (Returned.) 3537 (XIII).

CLARKE, Master HOWARD, Delhi, La.: Supposed meteorite, 3311 (XII).

CLEVELAND, CONVERSE, Englewood, N. J.: Insect. 3458 (VII).

COBB, LEE S., Hastings, Mich.: Two stone objects. (Returned.) 3548 (XIV).

COLE, L. J., Grand Rapids, Mich.: Bird skin. (Returned.) 3429 (II).

COLLINS, J. Y., New Whatcom, Wash.: Stone. (Returned.) 3602 (XIII).

CONAHAN, WILLIAM F., Salkum, Wash.: Ore. 3365 (XIII).

CONNOR, C. W., Hope, N. Dak.: Moth. (Returned.) 3756 (VII).

CONSTANT, E. W., Illawara, La.: Coin. (Returned.) 3386 (XVII).

CONWAY, W. J., Milwaukee, Wis.: Shells. (Returned.) 3475 (VI).

COOK, M. P. B., Lockport, N. Y.: Insect. (Returned.) 3753 (VII).

COOPER, JAMES S., Mount Gilead, Ohio: Stone with etched figures. (Returned.) 3284 (XIV).

CORNINGS, D., Claremont, N. H.: Clay. (Returned.) 3761 (XIII).

CORYELL, JAMES L., Deming, N. Mex.: Mineral. (Returned.) 3755 (XII).

COSTA RICA, NATIONAL MUSEUM OF, San José, Costa Rica.—Transmitted by Señor J. Fid Tristán: Crabs. 3449 (portion returned, remainder retained, 30099); 3735 (portion returned, remainder retained, 30777) (VIII).

COUGHLIN, G. E., Indianapolis, Ind., Bones. (Returned.) 3610 (IX).

COX, M. V., Silver City, N. Mex.: Ore. (Returned.) 3536 (XIII).

COX, PHILIP, St. John, New Brunswick: Three frogs. 3327 (30354) (IV).

CRAWFORD, JAMES, Colville, Wash.: Mineral. (Returned.) 3636 (XII).

CREVELING, Prof. C. C., Davenport College, Lenoir, N. C.: Plant. 3379 (XI).

CROCKET, B. D., San Augustine, Tex.: Fossils. (Returned.) 3650 (X–A).

CUNDIFF, W. H., Decatur, Tex.: Ore. (Returned.) 3250 (XIII).

CUNNINGHAM, B. L., Fort Klamath, Oreg.: Butterflies. (Returned.) 3416 (VII).

DANIEL, Dr. Z. T., Carlisle Barracks, Pa.: Insects. (Returned.) 3733, 3748 (VII).

DANIELS, Miss F. O., Athol Center, Mass.: Insect. (Returned.) 3243 (VII).

DARBY, P. D., Custer City, S. Dak.: Supposed fuller's earth. (Returned.) 3433 (XII).

DAVIS, T. HALL, Hampton, Va.: Supposed "madstone." (Returned.) 3500 (XIII).

DAWE, JOHN, Durango, Colo.: Rocks. 3516 (XIII).

DENNIS, Dr. R. E., Bishopville, S. C.: Insect. (Returned.) 3646 (VII).

DENNISON, G. W., Friday Harbor, Wash.: Rock. (Returned.) 3565 (XIII).

DILG, CARL, Chicago, Ill.: Archæological objects. (Returned.) 3287 (XIV).

DOLPHYN, W. L., Hillsboro, Tex.: Insect. (Returned.) 3535 (VII).

DONLON, Rev. A. J., Washington, D. C.: Niagara fossils. (Returned.) 3481 (X–B).

DOOLITTLE, WILLARD, Fullerton, Ohio: Three ancient coins. (Returned.) 3307 (XVII).

DOUGLASS, A. E., American Museum of Natural History, New York City: Terra-cotta flageolet from Mexico and three stone whistles from Missouri. (Returned.) 3502 (XIV).

DRAKE, E. F., Seattle, Wash.: Ore. (Returned.) 3518 (XIII).

DUERDEN, J. E. (See under Jamaica, Institute of.)

DUNCAN, Dr. W., Savannah, Ga.: Egg-case of a fish. (Returned.) 3286 (V).

DUPREE, WILLIAM, Brooklyn, N. Y.: Fossil from the Upper Cretaceous. (Returned.) 3489 (X–B).

DURAND, C. F., Lockport, N. Y.: Insect. 3710 (VII).

EBERSOLD, T. F., Oceanus, Fla.: Plant. 3330 (XI).

EDWARDS, Prof. C. L., University of Cincinnati, Cincinnati, Ohio: Crabs, etc., from the Bahama Islands. (Returned.) 3640 (VIII).

EGBERT, FERDINAND, Barstow, Cal.: Rock. (Returned.) 3721 (XIII).

EGERT, C. D., Price, Utah: Mineral. (Returned.) 3605 (XII).

ELDRIDGE, H. E., Apalachicola, Fla.: Mole cricket. (Returned.) 3486 (VII).

ELLS, JAMES E., Norwalk, Conn.: Infusorial earth. (Returned.) 3415 (XII).

EMERSON, HENRY, Delamar, Nev.: Ore. (Returned.) 3377 (XIII).

EMMONS, Lieut. G. F., U. S. Navy. (See under Rev. J. Loomis Gould.)

ENGLEHARDT, J. H., Montgomery, Ala.: Insect. (Returned.) 3670 (VII).

ERRET, S. S., Cook City, Mont.: Rocks. (Returned.) 3373 (XIII).

ERWIN, A. B., Port Kennedy, Pa.: Red clay. 3293 (XIII).

ESMOND, DARWIN W., Newburg, N. Y.: Herbarium specimen. 3302 (XI).

EVERETT, L. M., Clark, Fla.: Fossils. 3595 (30535) (X–B).

FANNIN, JOHN, Provincial Museum, Victoria, British Columbia. Bird. (Returned.) 3447 (II).

FASSETT, C. M., Spokane, Wash.: Minerals. (Returned.) 3255 (XII).

FAUL, F., Trail, Ohio.: Insect. (Returned.) 3697 (VII).

FEISE, HENRY, Spokane, Wash.: Sand; clay. (Returned.) 3289, 3296 (XIII).

FETCH, Rev. J. W., Winchester, Ky.: Part of a fossil skull of a mammal. 3542 (30313) (X–A).

FINKELNBURG, W. A., Winona, Minn.: Indian pottery. 3555 (XIV).

FISHER, H. L., Stockton, N. J.: Insect; moth. 3424 (3709 returned) (VII).

FISHER, Mrs. M. A., National Military Home, Ohio: Rock and coal. (Returned.) 3417 (XIII).

FLOOD, OLIVER D., Clinton, Mass.: Twenty-eight birds' skins from the Hawaiian Islands. (Returned.) 3345 (II).

FLOWER, F. G., Latona, Minn.: Seeds. (Returned.) 3691 (XI).

FLOYD, W. J., Eureka Springs, Ark.: Rock. (Returned.) 3546 (XIII).

FOHL, G. M., Greenville, Ky.: Insect. (Returned.) 3262 (VII).

FONT, H. C., Hartmonsville, W. Va.: Mineral. (Returned.) 3604 (XII).

FOWLER, ROBERT, Omro, Wis.: Bird-shaped stone; Indian relics. (Returned.) 3611, 3722 (XIV).

FREEMAN, D. W., Cardington, Ohio: Insect. (Returned.) 3492 (VII).

FRENCH, J. C., Olean, N. Y.: Minerals; ores; sand; metal. (Returned.) 3366, 3380, 3400, 3465 (XII, XIII).

FRICK, LOUIS, Wymore, Nebr.: Ore. (Returned.) 3396 (XIII).

FRIEDRICH, ISAAC, Roswell, N. Mex.: Copper cup (?) from Arizona. (Returned.) 3682 (XIV).

FRIX, A. M., Calhoun, Ga.: Insect. 3765 (30990) (VII).

FRYE, Mrs. H. L. M., Washington, D. C.: Metal mold showing the orbit of the comet of 1682. 3673 (XVII).

FUCHS, H. T., Tiger Mill, Tex.: Two specimens of rock; medical preparation. 3324 (returned); 3426 (XIII, XVII).

GALLAHER, E. D., Roslyn, Wash.: Ores; minerals. (Returned.) 3294, 3350, 3389 (XIII, XII).

GAMBELL, J. C., Winchester, Kans.: Supposed meteorite. (Returned.) 3357 (XII).

GARNETT, A. H., Whiterock, Okla.: Rock. (Returned.) 3752 (XIII).

GEBHART, Dr. J. S., Hot Springs, Ark.: Nuts. 3390 (XI).

GEREND, J. N., Sheboygan, Wis.: Stone from a mound. (Returned.) 3566 (XIV).

GERRARD, EDWARD, Camden Town, London, England: Birds' skins. 3369 (portion returned, remainder retained, 29910) (II).

GIBNEY, L. E., Camden, Ark.: Clay. (Returned.) 3685 (XIII).

GIBBS, A. S., Kingston, Ill.: Stone implement. 3560 (XIV).

GIESLER, R. G., Vincennes, Ind.: Insect. (Returned.) 3397 (VII).

GILLILAN, Rev. J. D., Liberty Park, Salt Lake, Utah: Copper coin. (Returned.) 3621 (XVII).

GOLDSMITH, I., Duncan, Ariz.: Rock. 3773 (XII).

GODBEY, Rev. S. M., Morrisville, Mo.: Shells. 3442 (returned with the exception of one specimen, 30007) (VI).

GOODWIN, Mrs. S. H., Lake Placid, N. Y.: Plant; herbarium specimen. 3309, 3372 (XI).

GOULD, C. N., Maple City, Kans.: Fossils. (Returned.) 3358, 3551, 3632 (returned with one exception, 30504) 3658, 3704, 3742 (X–B).

GOULD, Rev. J. LOOMIS, Jackson, Ala.: Two slate carvings. (Returned.) 3680 (XV). Transmitted by Lieut. G. F. Emmons, U. S. Navy.

GREELEY, E. T., Aurora, Nev.: Ore. (Returned.) 3375 (XIII).

GREENE, JOHN, Salt Lake City, Utah: Mineral. (Returned.) 3715 (XII).

GRINTER, T. W., Cincinnati, Ohio: Supposed pebble. (Returned.) 3649 (XIII).

GROUT, H. W., Waterloo, Iowa: Piece of worked flint. (Returned.) 3552 (XIV).

GUTHRIE, LEON M., Johnson City, Tex.: Insect. (Returned.) 3301 (VII).

HAIL, E., Ozark, Ark.: Fossils. (Returned.) 3707 (X–B).

HALE, A. N., Gloversville, N. Y.: Sand. (Returned.) 3503 (XII).

HALE, JAMES F., Pikeville, Tenn.: Geological material. 3238 (XIII).

HALL, Mrs. C. C., Westport Point, Mass.: Plants. 3361 (29828) (XI).

HAMBRIGHT, T. S., Easton, Wash.: Ores. (Returned.) 3381 (XIII).

HAMILTON, CHARLES, Carl Junction, Mo.: Minerals. (Returned.) 3587 (XII).

HAND, A. W., Carlisle, N. Mex.: Insect. (Returned.) 3393 (VII).

HANNAH, R. H., Olympia, Wash.: Stone implement. 3352 (29940) (XIV).

HANSEN, A. J., Walnut, Iowa: Insect. (Returned.) 3705 (VII).

HARDEMAN, THOMAS, Birmingham, Ala.: Insects. 3718 (30702) (VII).

HARDY, A. H., Boston, Mass.: Stone pipe. (Returned.) 3625 (XIV).

HARDY, Hon. A. M., House of Representatives: Rock from Indiana. (Returned.) 3530 (XIII).

HARRIS, WARREN, Glendale, Utah: Ores. (Returned.) 3575 (XIII).

HARRISON, ARTHUR K., Lebanon Springs, N. Y.: Shells. 3326 (29754) (VI).

HART, JOHN M., Perry, Okla.: Stone. (Returned.) 3395 (XIII).

HATCH, C. W., Buchanan, Mich.: Insect. (Returned.) 3270 (VII).

HAVEMANN, L., Rancher, Mont.: Fossils. 3601 (X–B).

HAWKINS, A. R., Gatesville, Tex.: Antique pistol. (Returned.) 3331 (XV).

HAYSLIP, J. J., Bartlett, Tex.: Piece of a silver plate with engravings, letters, etc.; stone. (Returned.) 3678 (XVII, XIII).

HAZEN, Gen. H. A., Washington, D. C.: Insect. (Returned.) 3348 (VII).

HEDGE, J. C., Sopchoppy, Fla.: Clays. (Returned.) 3466 (XIII).

HEDGES, H. S., Waterville, Wash.: Clay; minerals; ores. (Returned.) 3589; 3635; 3719; 3763 (XIII, XII; XIII).

HEIGHWAY, A. E., Murphy, N. C.: Talc. 3427 (30738) (XIII).

HELTON, O. P., Shelbyville, Ill.: Stone implements. 3609 (30466) (XIV).

HENDRICK, Hon. J. K., House of Representatives: Pebble; mineral. 3711 (returned); 3734 (XIII, XII).

HETHERINGTON, J. P., Logansport, Ind.: Crystals with black substance adhering; material found in a limestone quarry. 3310, 3321 (XII, XIII).

HILL, Mrs. ARTHUR, Corry, Pa.: Insect. 3413 (VII).

HILL, W. W., Jamesburg, N. J.; Archæological objects. (Returned.) 3472, 3543 (XIV).

HILLMAN, F. G., New Bedford, Mass.: Archæological object from Tennessee. (Returned.) 3342 (XIV).

HOLDAWAY, DEAN, Price, Utah: Rock. (Returned.) 3726 (XIII).

HOLMES, I. S., Bowmans Bluff, N. C.: Larva of moth. 3731 (30776) (VII).

HOLMES, S. J., Chicago, Ill.: Four specimens of Anomurans from California. 3464 (three specimens returned, and one retained, 30072) (VIII).

HOLT, E. B., Mesilla Park, N. Mex.: Bird. (Returned.) 3717 (II).

HOOD, S. B., Sparta, Ill.: Fragment of a supposed meteorite. (Returned.) 3425 (XII).

HOOPES, B. A., Organ, N. Mex.: Parrot. 3245. (Specimen purchased by Dr. Ralph and presented by him, 30381.) (II).

HOOPES, JOSIAH, West Chester, Pa.: Birds' skins. (Returned.) 3248, 3437, 3533 (II).

HOPKINS, LEWIS S., Lynchburg, Ohio: Small stone tablet. (Returned.) 3283 (XIV).

HUGHES, H. F., Harbor, Oreg.: Rock; two specimens of supposed grasses; rocks. 3508, 3562 (30339) (XIII, XI).

HUMPHRIES, W. F., Holum, La.: Geological material. (Returned.) 3435 (XIII).

HUTCHINSON, Dr. W. F., Winchester, Va.: Bird; leaves. 3573, 3747 (II, XI).

HUTTON, A., Huttonsville, W. Va.: Ore; earth. (Returned.) 3405, 3438 (XIII).

HUTTON, W. McG., Buffalo City, N. C.: Insect. 3288 (VII).

HYDE, LOUIS H., Joliet, Ill.: Fossil insect. (Returned.) 3746 (X–B).

INTERIOR DEPARTMENT, U. S. GEOLOGICAL SURVEY: Piece of sandstone containing the impression of a fossil fish from the sandstone quarry at Pioneer, on the western slope of Coast Range, east of Yaquina Bay. (Returned.) 3484 (X–A).

JAMAICA, INSTITUTE OF, Kingston, Jamaica.—Transmitted by J. E. Duerden, acting secretary: Crustaceans. 3545 (portion returned, and one specimen retained, 30276) (VIII).

JAMES, P. L., Paris, Tex.: Dagger. (Returned.) 3260 (XV).

JAMES, P. R., Stratford, Ontario, Canada: Insects. 3314 (VII).

JANNEY, B. T. (See under Breed, Estate of Dr. Daniel.)

JARVIS, P. W., Kingston, Jamaica: Crabs. 3418 (portion returned, and remainder retained, 29986 and 30112); 3520 (portion returned; remainder retained, 30337); 3561 (portion returned, and remainder retained, 30337); 3648 (30744) (VIII).

JEWETT, H. B., Wilmington, N. C.: Portions of a sturgeon. (Returned.) 3754 (V).

JOHNSON, E. B., Kinsley, Kans.: Bone. (Returned.) 3268 (IX).

JOHNSON, R. P., Chattanooga, Tenn.: Ore. (Returned.) 3531 (XIII).

JOHNSTONE, Lieut. W. B., Golden Pond, Ky.: Insect. (Returned.) 3364 (VII).

JONES, McMILLAN, Paris, Ill.: Supposed petrifaction. (Returned.) 3630 (X–B).

JONES, THOMAS E., Mangum, Okla. T.: Herb. 3672 (XI).

JONES, T. D., Relay, Md.: Archæological objects. (Returned.) 3572 (XIV).

JONES & JONES, Orlando, Fla.: Supposed lime. 3617 (XIII).

JORDAN, JOHN N., Letts Corner, Ind.: Skull of a mammal. (Returned.) 3664 (I).

JUDD, L. N., Garnett, Kans.: Five coins. (Returned.) 3491 (XVII).

KALDING, C. D., Drytown, Cal.: Birds' skins. (Returned.) 3467, 3519 (II).

KELLEY, ANDREW, Kingston, N. Mex.: Insects. (Returned.) 3454 (VII).

KENNEDY, E. J., Troy, Pa.: Metal. (Returned.) 3674 (XIII).

KENNEDY, FRANK, Laramie, Wyo.: Sample of supposed china clay. (Returned.) 3677 (XIII).

KENT, A. J., Bonners Ferry, Idaho: Ores. 3325, 3591 (3336 returned) (XIII).

KIDD, E. Z., Deadwood, S. Dak.: Ore. 3298 (XVII).

KIDDER, G. M., Salt Lake City, Utah: Rock. (Returned.) 3683 (XIII).

KILPATRICK, WILLIAM, Malvern, Ark.: Rock; supposed phosphate of lime. (Returned.) 3460, 3482 (XIII).

KIMBALL, G. N., Waltham, Mass.: Insects. (Returned.) 3280 (VII).

KIMBER, Rev. A. C., New York City: Mineral. (Returned.) 3687 (XII).

KING, LARKIN, San Saba, Tex.: Ore. (Returned.) 3495 (XIII).

KING, Mrs. MARTHA E., Eagle Rock, Va.: Minerals. (Returned.) 3335 (XII).

KIRSCH, P. H., Columbia City, Ind.: Marine invertebrates. 3751 (portion returned; remainder retained, 30894) (VIII).

KNOWLTON, W. J., Boston, Mass.: Emeralds and zircons. 3257 (XII).

KOBBE, Maj. WILLIAM A., U. S. Army: Larvæ of insects. 3281 (VII).

KOCH, AUG., Williamsport, Pa.: Bird skin. (Returned.) 3666 (II).

LAFLER, H. A., Dewitt, Nebr.: Marine invertebrates. 3239 (29608) (VIII).

LANGDALE, J. W., Washington, D. C.: Minerals. (Returned.) 3346 (XII).

LANKS, F. E., Chathams Run, Pa.: Five archæological objects. 3378. (Returned, with the exception of one retained for study.) (XIV.)

LAU BACH, H. G., Arapahoe, Nebr.: Spider. (Returned.) 3247 (VII).

LEACH, WARREN R., Rushville, Ill.: Supposed duck. (Returned.) 3627 (II).

LEE, HOMER, New York City: Button. (Returned.) 3367 (XVII).

LEWIS, Dr. S. M., Whitepost, Va.: Worm. 3316 (VII).

LIVELY, L. A., New Richmond, W. Va.: Ores. (Returned.) 3241, 3273 (XIII).

LOBIN, T. E., McMinnville, Oreg.: Ore. (Returned.) 3499 (XIII).

LOOMIS, L. M. (See under California Academy of Sciences.)

LOSEE, RICHARD, Radersburg, Mont.: Rock. (Returned.) 3618 (XIII).

LOUNT, W. B., Phœnix, Ariz.: Insect. 3757 (VII).

LOVELL & JONES, Davis, Ind. T.: Ores. 3391 (3478 returned) (XIII).

LOWE, Dr. J. H., Holum, La.: Ore; geological material. 3351, 3446 (30011) (XIII).

LOWE, W. P., Beulah, Colo.: Teeth of a fossil fish and a supposed fossil shell. (Returned.) 3569 (X-B).

LUECKE, C. A., Schulenburg, Tex.: Bones. (Returned.) 3277 (IX).

LYLE, A. J., Malinda, Ga.: Minerals. (Returned.) 3333 (XII).

MCCARTHER, J. T., Juab, Utah: Rock. (Returned.) 3456 (XIII).

MCCLELLAND, Mrs. H. L. C., Austinburg, Ohio: Geological specimens. (Returned.) 3452 (XIII).

MCCOY, Dr. C. E., Franklin, N. C.: Ore. (Returned.) 3269 (XIII).

MCCREA, JOHN B., Aledo, Ill.: Insects. (Returned.) 3423 (VII).

MCGREGOR, RICHARD C., Palo Alto, Cal.: Forty-three birds' skins from Panama; fifteen birds' skins. (Returned.) 3741, 3762 (II).

MCILHENNY, E. A., Avery Island, La.: Six birds' skins. (3275 returned); four birds' skins 3318 (29812) (II).

MCKINNEY, F., Mason, Tex.: Insects. (Returned.) 3740 (VII).

MCMASTERS. A. B., Plymouth, N. Y.: Insect. 3290 (VII).

MACKAY, G. H., Boston, Mass.: Fifteen young birds; four birds' skins from Massachusetts. (Returned.) 3320, 3485 (II).

MALIN, A. C., Mesa, Ariz.: Supposed cement. (Returned.) 3259 (XIII).

MANCHESTER, C. B., Kinsley, Kans.: Minerals. (Returned.) 3322 (XII).

MANGER, Dr. R., San Antonio, Tex.: Mountings of insects on glass. (Returned.) 3684 (VII).

MANGOLD, F. A., Colorado Springs, Colo.: Eskimo pipe. (Returned.) 3654 (XV).

MARTIN, DUDLEY A., Duboistown, Pa.: Stone implements. (Returned.) 3644 (XIV).

MARTIN, P. R., Richfield, Nebr.: Mineral. (Returned.) 3603 (XII).

MASON, S. G., Oregon, Ill.: Fossil. (Returned.) 3744 (X-B).

MAXON, W. A., Oneida, N. Y.: Bird skin. (Returned.) 3263 (II).

MAXWELL, C. W., Danville, Va.: Cocoons. (Returned.) 3549 (VII).

MEANS, H. C., Everett, Pa.: Minerals. (Returned.) 3490 (XII).

MEENAN, W. A., Ridgway, Pa.: Insect. (Returned.) 3776 (VII).

MELLICHAMP, J. H., Bluffton, S. C.: Insect. (Returned.) 3258 (VII).

MERE, THOMAS DE LA, Mercur, Utah: Rocks. (Returned.) 3523 (XIII).

MERRICK, E. T., New Orleans, La.: Fragment of a book showing the action of bacteria. (Returned.) 3414 (VII).

MILLER, CHARLES, Jr., Grand Rapids, Mich.: Two specimens of minerals. 3368 (XII).

MILLER, G. R. M., Chapel Hill, Miss.: Cast of a crinoid column. (Returned.) 3526 (X–B).

MITCHELL, Hon. J. D., Victoria, Tex.: Bird and eggs. (Returned.) 3737 (II).

MOFFATT, E. E., Winsted, Conn.: Chrysalis of an insect. (Returned.) 3347 (VII).

MONROE, ALONZO, Elmgrove, Ohio: Specimen of supposed hematite. (Returned.) 3629 (XIII).

MOORE, ALEX., Addy, Wash.: Mineral. (Returned.) 3769 (XII).

MOORE, Mrs. L. D., Huntsville, Ala.: Photographs, and rock with supposed inscrptions. 3265 (31846) (XIV).

MOORE, W. H., Deadwood, S. Dak.: Ore. (Returned.) 3540 (XIII).

MORLOCK, HENRY, Fostoria, Ohio: Turtle-shell; fossils; geological material; beans. 3541 (portion returned, remainder retained, 30347); 3615 (IV; X–B; XIII; XI).

MORRISON, J. L., Greenville, Pa.: Dust or powder resembling snow. 3570 (XIII).

MOSIER, C. A., Des Moines, Iowa: Supposed stone implement from South Dakota. (Returned.) 3764 (XIV).

MOSS, T. A., Wattsville, La.: Ore. (Returned.) 3384 (XIII).

MURCH, E. F., Ellsworth, Me.: Bird skin. (Returned.) 3291 (II).

MURRAY, Michael, Anaconda, Mont.: Ore. (Returned.) 3581 (XIII).

MYER, W. E. (See under W. C. Sutton.)

NEFF, GEORGE, Masontown, Pa.: Head of an insect. (Returned.) 3750 (VII).

NEVILLE, RUSSELL, Kewanee, Ill.: Fossil. (Returned.) 3579 (X–B).

NEWBERRY, Rev. C. E., Puget Sound Academy, Coupeville, Wash.: Nudibranch mollusk from Puget Sound with a photograph of the same; photographs of marine invertebrates; specimen of *Astrophyton*. 3488 (portion returned; remainder retained, 30790) 3713 (VIII, VI, VIII).

NEWLON, Dr. W. S., Oswego, Kans.: Skull of a mammal; paleontological objects. 3457 (30156); 3668 (returned). (IX, X–B.)

NEWMAN, S. B., Salt Lake City, Utah: Colonial currency. (Returned.) 3730 (XVII).

NEWTON, H. C., Springfield, Mo.: Ore. (Returned.) 3563 (XIII).

NICHOLS, J. P., Salt Lake City, Utah: Ore. (Returned.) 3651 (XIII).

NICHOLS, Dr. W. V., Oceanside, Cal.: Fossil shell and sample of earth. (Returned.) 3431 (X–B).

NICKELL, T. J., Grand River, Ky.: Ore. (Returned.) 3729 (XIII).

NICKLIN, J. B., Chattanooga, Tenn.: Copper tomahawk. (Returned.) 3305 (XIV).

O'CONNOR, M., Lockport, N. Y.: Sample of charcoal containing insects. 3770 (VII).

OBERHOLZ, Mrs. F. C., Washington, D. C.: Two insects. (Returned.) 3737 (VII).

OLMSTED, H. C., Coudersport, Pa.: Rocks. (Returned.) 3354 (XIII).

ORAI, C. B., Pine, Oreg.: Rock. (Returned.) 3506 (XIII).

ORCUTT, C. R., Orcutt, Cal.: Seeds. 3471 (XI).

OSBORNE, Prof. H. L., Hamline University, St. Paul, Minn.: Marine shells from the Philippine Islands. 3647 (VI).

OSGOOD, W. H., San José, Cal.: Two birds. (Returned.) 3567 (II).

OSMAN, Mrs. L. E., Hillsboro, New Brunswick: Plants. 3240 (XI).

PARKER, JAMES H., Whiteoaks, N. Mex.: Marble. (Returned.) 3408 (XIII).

PARMENTER, C. S. (See under Baker University.)

PARSONS, Dr. W. B., Missoula, Mont.: Snake. 3299 (IV).

PASCOE, A. H., Pass Christian, Miss.: Skull of a mammal. 3594 (30539) (I).

PATTON, Dr. W., Ammie, Ky.: Coal. 3501 (30152) (XIII).

PEABODY, P. B., St. Vincent, Minn.: Three birds' skins. (Returned.) 3612 (II).

PEARSE, A. S., Dewitt, Nebr.: Freshwater crustaceans; toad and frog. 3403 (29948); 3571 (returned). (VIII, IV.)

PEARSON, JAMES, Germantown, Nebr.: Sand. (Returned.) 3661 (XIII).

PERRINE, C. O., Riverside, Cal.: Minerals. (Returned.) 3371 (XIII).

PERRY, H. J., Cooperstown, N. Y.: Insects. (Returned.) 3279 (VII).

PHILLEO, Miss LILLIE A., Milan, Ill.: Mollusk. 3410 (30218) (VI).

PHILLIPS, L. H., Geneva, Ohio: Stone, supposed to be meteoric. (Returned.) 3584 (XII).

PHIPPS, R. B., Scottville, N. C.: Stone. (Returned.) 3564 (XIII).

PON, Dr. J. F., Waynesboro, Miss.: Mineral from Alabama, supposed to contain medicinal properties, and a small vial of liquid obtained by pouring water on the mineral. 3480 (XVII).

PORTER, C. L., Mohave City, Ariz.: Insect. (Returned.) 3574 (VII).

PORTER, J. B., Glendale, Ohio: Worms. 3402 (VII).

POWELL, Maj. J. W. (See under Smithsonian Institution, Bureau of Ethnology).

PRICE, T. H., Hyattstown, Md.: Rock. (Returned.) 3700 (XIII).

PRICE, V. T., Rapid City, S. Dak.: Supposed fuller's earth. (Returned.) 3254 (XIII).

PRICE, W. F., Florence, Ala.: Stone relic from Tennessee. (Returned.) 3559 (XIV).

PRINGLE, H. N., Anoka, Minn.: Geological material. 3628 (XIII).

PRITCHARD, J. T., White Hills, Ariz.: Ores. (Returned.) 3745 (XIII).

PROCTOR, J. M., Crossville, Tenn.: Ore. (Returned.) 3732 (XIII).

PROVINCIAL MUSEUM, Victoria, British Columbia: Birds' skins. (Returned.) 3360 (II).

QUICK, J. G., Coudersport, Pa.: Three specimens of ores. (Returned.) 3319 (XIII).

RABER, C. A., Cherry, Ariz.: Ore. (Returned.) 3596 (XIII).

RAGLAND, J. M., Osceola, Mo.: Ore. (Returned.) 3401 (XIII).

RANDOLPH, P. B., Madison, Wash.: Shells. 3317 (portion returned, remainder retained, 29720) (VI).

RANDOLPH, R. H., Colleen, Va.: Ores. (Returned.) 3409 (XIII).

RANDOLPH, T. B., Cadiz, Ky.: Mineral; specimen resembling a pearl. (Returned.) 3598; 3712 (XII, VI).

READING, D. G., Franklin, Pa.: Insect. (Returned.) 3328 (VII).

REESE, C., Mannie, Tenn.: Insect. (Returned.) 3558 (VII).

REID, W. J., Medora, N. Dak.: Ores. (Returned.) 3738 (XIII).

REMPUS, F. L., Sheltonville, Ga.: Crystal sand. 3261 (XIII).

RHODES, EMMETT, Auburn, N. Y.: Bank note of Rhode Island. (Returned.) 3623 (XVII).

RICE, B. W., Oasis, Utah: Mineral; fossils; rock. 3657, 3665 (30599); 3698 (returned) (XII, X-B, XIII).

RICKLEY, A. M., Columbus, Ohio: Drilled ceremonial object from Illinois. (Returned.) 3441 (XIV).

ROBERTS, C. H., Paris, Ontario, Canada: Stone implements. (Returned.) 3689 (XIV).

ROBINSON, Lieut. WIRT, U. S. Army: One hundred and forty-one birds' skins from Margarita Island and the mainland of Venezuela; one hundred birds' skins from the same localities. (Returned.) 3343, 3353 (II).

ROGERS, Mrs. C. E., Grover, Utah: Rock. (Returned.) 3246 (XIII).

ROGERS, JOHN, San Saba, Tex.: Ore. 3556 (XIII).

ROMEYN, Capt. HENRY, U. S. Army: Two beetles. 3237 (29562) (VII).

ROSE, S. E., Conicville, Va.: Ore. (Returned.) 3608 (XIII).

ROTHE, L. F., Glendive, Mont.: Minerals. (Returned.) 3619 (XII).

ROUTZAHN & GILKEY, Los Angeles, Cal.: Sample of supposed clay found on the Colorado Desert. (Returned.) 3507 (XIII).

ROWELL, GEORGE P., Percy, N. H.: Plants. 3383, 3736 (XI).

RUFF, J. AYLETT, Cincinnati, Ohio: Insect galls. 3775 (30991) (VII).

RUSSELL, J. R., Kingman, Ariz.: Ore. (Returned.) 3522 (XIII).

RUTLEDGE, J. J., Juneau, Alaska: Ore. (Returned.) 3772 (XII).

SAGER, A J., Chambersville, Va.: Stone. (Returned.) 3392 (XIII).

SARVER, C. A., Sarver, Wyo.: Rock. (Returned.) 3585 (XIII).

SAUL, CHARLES, Ellinger, Tex.: Supposed sand. (Returned.) 3557 (XIII).

SAUNDERS, MORRIS B., East Norwalk, Conn.: Insect; beetle. 3242 (3278 returned) (VII).

SAUNDERS, W. G., New Bridge, Oreg.: Insect. (Returned.) 3758 (VII).

SAVAGE, M. F., New York City: Musical instruments and ethnological objects. 3675 (portion returned, and remainder retained, 30545, 30546, 30547) (XV).

SAVAGE, Rev. WILLIAM R., Virginia Beach, Va.: Insects. (Returned.) 3708 (VII).

SCHAEFFER, JOHN B., Chicago, Ill.: Two fossils from Germany. 3476 (30111) (X–B).

SCHOUTTE, S. H. F., National, Iowa. Transmitted by Hon. Thomas Updegraff, M. C.: Ore. (Returned.) 3600 (XIII).

SHAW, C. P., Alberene, Va.: Head of a snake. (Returned.) 3714 (IV).

SHELDON, Prof. C. S., Oswego, N. Y.: Two hundred and forty insects. 3462 (portion returned, and remainder retained, 30098) (VII).

SHERMAN, C. A., Manville, Wyo.: Ores. 3388 (XIII).

SHERRILL, F. J., Pomeroy, Wash.: Ore. (Returned.) 3272 (XIII).

SHRIVER, HOWARD, Cumberland, Md.: Fossils. (Returned.) 3443 (X–B).

SHUFELDT, Dr. R. W. (See under L. W. Watkins.)

SHUTTLES, A. R., Greenville, Ga.: Insect. (Returned.) 3638 (VII).

SIMPSON, A. W., Buxton, N. C.: Substance found on the sea coast near Cape Hatteras. (Returned.) 3509 (XIII).

SKINNER, ROSE, Lafayette, Ind.: Specimen of "Mezuzah" on parchment. (Returned.) 3394 (XVI).

SLAUGHTER, L. T., Roanoke, Va.: Supposed petrified hickory nut. (Returned.) 3626 (X–B).

SMALLEY, C. W., Forestdale, Vt.: Mineral. (Returned.) 3655 (XII).

SMIDT, H. W., Horseshoe Bend, Idaho: Rocks. (Returned.) 3376 (XIII).

SMITH, A. D., Plymouth, Ind.: Insect. (Returned.) 3313 (VII).

SMITH, I. R., Salubria, Idaho: Minerals. (Returned.) 3643 (XII).

SMITH, L. F., Pearl, Idaho: Rocks. (Returned.) 3699 (XIII).

SMITH, T. B., Rose Creek, Minn.: Fossil bones. (Returned.) 3578 (X–B).

SMITH, W. P., Temple, Mo.: Supposed meteorites. 3341, 3399 (XII).

SMITHSONIAN INSTITUTION, Bureau of Ethnology, Maj. J. W. Powell, Director: Mammal bone, 3344 (returned); earthenware figurine. 3529 (specimen and one cast of figurine returned, one cast retained, 30352) (IX, XV).

SMOUT, Mrs. T. J., Wood River, Nebr.: Photograph of signatures of members of the "Non Importation Association" in the Continental Congress, October 20, 1774. 3767 (31848) (XVII).

SNYDER, J. S., Two Taverns, Pa.: Ores. (Returned.) 3511 (XIII).

SORNBORGER, J. D., Cambridge, Mass.: Eighteen birds' skins from Labrador. (Returned.) 3527 (II).

SPENCER, A. C., Baltimore, Md.: Devonian fossils. (Returned.) 3667 (X–B).

SPIES, ALBERT, Newark, N. J.: Insect. (Returned.) 3428 (VII).

SPRAGUE, W. A., Boulder, Colo.: Birds' skins. (Returned.) 3411, 3498 (II).

SQUIER, JOHN N., Spokane, Wash.: Talc. 3463 (30067) (XIII).

STAFFORD, Prof. G. A., Winfield, Kans.: Mineral. (Returned.) 3274 (XII).

STAM, C. F., Chestertown, Md.: Mineral. (Returned.) 3385 (XII).

STANDISH, WILLIAM S., East Las Vegas, N. Mex.: Ore. (Returned.) 3768 (XII).

STEPHENS, F., Witch Creek, Cal.: Eleven birds' skins. (Returned.) 3338 (II).

STEWART, Dr. E. L., Starke, Fla.: Plant. 3323 (XI).

STEWART, Dr. T. B., Lock Haven, Pa.: Indian relics; two stone pipes from Canada and a chipped implement from Pennsylvania. (Returned.) 3271, 3592 (XIV).

STILWELL, L. W., Deadwood, S. Dak.: Archæological objects. 3303 (portion returned and remainder retained, 29818) (XIV).

STITH, N. B., Medora, N. Dak.: Ores. (Returned.) 3720 (XIII).

STONE, E. S., New York City: Fragment of supposed meteorite. (Returned.) 3439 (XII).

STONE, WITMER, Academy of Natural Sciences, Philadelphia, Pa.: Bird skin. (Returned.) 3535 (II). (See under Academy of Natural Sciences.)

STOUFFER, JEREMIAH, Freed, Pa.: Ore. (Returned.) 3300 (XIII).

STOUT, R. C., Caddo. Tex.: Rocks. (Returned.) 3725 (XIII).

STRATFORD, Major, Stratford, Ontario, Canada: Insects. 3314 (VII).

STRONG, E. C., Lewiston, Idaho: Crystals of mineral found in sand. (Returned.) 3266 (XII).

STUART, R. C. Alton, Ill.: Insect. (Returned.) 3749 (VII).

STURTZ, B., Bonn, Germany: Fourteen slabs with starfishes from the roofing slates of Bundenbach, Germany. 3568 (six slabs returned and eight retained, 30628) (X–B).

SUNSTINE, D. R., Apollo, Pa.: Two protuberances found on a rock 30 feet below the surface. (Returned.) 3236 (XIII).

SURFACE, Prof. H. A., Napa, Cal.: Insects. (Returned.) 3593 (VII).

SUTTON, W. C., Massada, Tenn.—Transmitted by W. E. Myer: Bones. (Returned.) 3430 (IX).

SWORD, J. F., Jonesville, Va.: Fifteen species of Unios. 3759 (portion returned and remainder retained, 30808) (VI).

TAYLOR, EVELYN, Tiverton, R. I.: Jaw of a fish. 3304 (31847) (V).

THE JAFFA-PRAEGER COMPANY, Roswell, N. Mex.: Substance resembling sand. (Returned.) 3660 (XIII).

THIBADEAU, E. L., Glenwood Springs, Colo.: Mineral. (Returned.) 3451 (XII).

THOMPSON, H. C., Centerville, Idaho: Ore. 3637 (XIII).

THOMPSON, Mrs. J. M., Ocala, Fla.: Supposed casts of ancient coins. 3606 (30552) (XIV).

THOMPSON, W. F., Fresnal, N. Mex.: Rock. (Returned.) 3690 (XIII).

THOMSON Master E. W., Delhi, La.: Supposed meteorite. (Returned.) 3311 (XII).

THORPE, Dr. H. H., Liberty Hill, Tex.: Two fossil bones. 3701 (30764) (X–B).

THROP, CHARLES H., Big Rapids, Mich.: Archæological objects. (Returned.) 3483 (XIV).

TIFFANY & Co., New York City: Emerald and zircon. 3332 (zircon returned and emerald retained, 29759) (XII).

TILFORD, N. C., Caneyville, Ky.: Insect. (Returned.) 3703 (VII).

TODD, AURELIUS, College Grove, Oreg.: Insect. 3453 (VII).

TOWNSEND, WILLIAM, Riverton, Iowa: Liquid for assay. (Returned.) 3586 (XIII).

TOWNSHEND, J. L., Payson, Utah: Rocks. (Returned.) 3653 (XIII).

TRISTÁN, Señor J. FID. (See under Costa Rica, National Museum of.)

TWYMAN, E. W., Twymans Mill, Va.: Insect. (Returned.) 3264 (VII).

UPDEGRAFF, Hon. THOMAS. (See under S. H. F. Schoutte.)

VAN EPPS, PERCY M., Glenville, N. Y.: Archæological object. (Returned.) 3473 (XIV).

VAN VLEET MANSFIELD DRUG COMPANY, Memphis, Tenn.: Bronze medal. (Returned.) 3445 (XVII).

VON SCHMIDT, J., Tustin City, Cal.: Contents of the crop of a canvas back duck. 3538 (30275) (XI).

VON WEDELL, CURT, Dobbs Ferry, N. Y.: Two insects. 3355 (VII).

VOSS, HENRY, Richmond, Tex.: Four rocks. (Returned.) 3494 (XIII).

WARD, FRANK A., Rochester, N. Y.: Two birds' skins. (Returned.) 3459 (II).

WARD'S NATURAL SCIENCE ESTABLISHMENT, Rochester, N. Y.: Twenty-four humming-birds from Colombia, Ecuador, and Mexico. (Returned.) 3292 (II).

WARLICK, C. E., Giddings, Tex.: Earth. (Returned.) 3580 (XIII).

WARREN, H. M., Luray, Va.: Larva of an insect. (Returned.) 3363 (VII).

WASHINGTON, LAWRENCE, Alexandria, Va.: Clay. (Returned.) 3442 (XII).

WATKINS, L. WHITNEY, Manchester, Mich.—Transmitted by Dr. R. W. Shufeldt: Bird. (Returned.) 3448 (II).

WATSON, J. D., Mayfield, Ky.: Mineral. (Returned.) 3686 (XII).

WATTERSON, W. J., Downington, Pa.: Potato embedded in wood. (Returned.) 3671 (XI).

WATTS, B. F., Wanamaker, Okla.: Rock. (Returned.) 3544 (XIII).

WAYNE, A. T., Mount Pleasant, S. C.: Two birds' skins. (Returned.) 3497, 3777 (II).

WEBB, I. A., Deadwood, S. Dak.: Supposed fuller's earth. (Returned.) 3308 (XIII).

WEBB, WALTER F., Albion, N. Y.: Two birds' skins; coral. (Returned.) 3387, 3599 (II, VIII).

WEBBER, W. A., Culp, Ark.: Plant; siliceous substance. 3297; 3370 (returned) (XI, XIII).

WEIR, JAMES, Jr., Dr., Owensboro, Ky.: Insect. (Returned.) 3679 (VII).

WEIR, PAUL, Owensboro, Ky.: Stone implements; six flint implements. (Returned.) 3590, 3694 (XIV).

WEYMER, JOSEPH, Kingston, Minn.: Stone. (Returned.) 3695 (XII).

WHITE, W. SEYMOUR, Fredericksburg, Va.: Clay. 3276 (XIII).

WHITEHORN, G. W., Rochester, Nebr.: Supposed native lime. (Returned.) 3616 (XIII).

WHITEHORN, WORTH, Rochester, Nebr.: Fossil tooth and bone. 3724 (30824) (X–B).

WHITELAW, D., Eufaula, Ind. T.: Insects. (Returned.) 3641 (VII).

WHITACRE, JACOB, Okonoko, W. Va.: Minerals. (Returned.) 3524 (XII).

WHITAKER, E. W., Gloversville, N. Y.: Ore. (Returned.) 3487 (XIII).

WHITNEY, A. B., North Spencer, N. Y.: Fragment of a supposed meteorite. (Returned.) 3645 (XII).

WILKINS, F. L., Eugene, Oreg.: Rock. (Returned.) 3624 (XIII).

WILKINSON, E., Mansfield, Ohio: Mineral. (Returned.) 3517 (XII).

WILLIAMS, D. F., Mount Vernon, Ind.: Vegetable compound. (Returned.) 3521 (XI).

WILSON, Master ST. JOHN, Delhi, La.: Supposed meteorite. (Returned.) 3311 (XII).

WILSON, J. M., Jr., Kissimmee, Fla.; Roots of a plant. 3513 (XVII).

WILSON, T. C., Taylor, Tex.: Insect. (Returned.) 3244 (VII).

WILVERT, EMILE, Sunbury, Pa.: Two stones. (Returned.) 3436 (XII).

WING, E. T., Pleasantdale, Me.: Fragment of worked bone from Maine; chipped flint disk or scraper from Indiana, and a carved stone object from Montana. 3663 (XIV).

WING, J. S., Sr., Springville, Utah: Rocks. (Returned.) 3583 (XIII).

WOODRUFF, IDA, Balls Ferry, Cal.: Metal. 3253 (XIII).

WORTHEN, C. K., Warsaw, Ill.: Five mammal skins and skulls from Montana. (Returned.) 3339 (I).

WRAY, F. P., Whiteplains, Va.: Insect. (Returned.) 3340 (VII).

WRIGHT, BERLIN H.: Penn Yan, N. Y.: Fresh-water shells. 3553 (portion returned and remainder retained, 30279) (VI).

YALE, CHARLES, Louisiana, Mo.: Two specimens of stylobites. 3374 (one specimen returned and one retained, 29917) (XIII).

YOUNG, L. J., Oswego, Ill.: Photographs of old coins. (Returned.) 3607 (XVII).

ZIMMERMAN, P. C., Shiremanstown, Pa.: Ore; sand; two minerals. (Returned.) 3440, 3450, 3514 (XIII, XII).

Index to list of specimens received for examination and report, arranged geographically.

Source.	Record number of lots.
North America:	
British America	3240, 3314, 3327, 3360, 3419, 3447, 3527, 3592, 3689.
Central America	3449, 3735.
Mexico	3292, 3502.
United States:	
Alabama	3265, 3480, 3517, 3670, 3718.
Alaska	3680.
Arizona	3248, 3259, 3267, 3522, 3574, 3576, 3596, 3656, 3676, 3681, 3745, 3757, 3762, 3773.
Arkansas	3297, 3370, 3390, 3460, 3463, 3482, 3546, 3685, 3707.
California	3253, 3265, 3338, 3371, 3431, 3464, 3467, 3471, 3493, 3507, 3519, 3534, 3538, 3539, 3554, 3567, 3593, 3613, 3614, 3721, 3762.
Colorado	3411, 3451, 3498, 3516, 3569, 3654.
Connecticut	3242, 3278, 3347.
District of Columbia	3344, 3346, 3348, 3481, 3672, 3727.
Florida	3323, 3330, 3337, 3415, 3466, 3486, 3513, 3532, 3595, 3606, 3617, 3634, 3666.
Georgia	3237, 3261, 3286, 3333, 3406, 3638, 3765.
Idaho	3266, 3325, 3336, 3376, 3591, 3637, 3643, 3699.
Illinois	3287, 3410, 3423, 3425, 3441, 3474, 3560, 3579, 3607, 3609, 3627, 3630, 3744, 3746, 3749, 3760.
Indiana	3310, 3313, 3321, 3397, 3521, 3530, 3610, 3663, 3664, 37511.
Indian Territory	3390, 3478, 3641, 3728.
Iowa	3552, 3586, 3600, 3705.
Kansas	3268, 3274, 3322, 3357, 3358, 3457, 3491, 3551, 3631, 3632, 3658, 3668, 3704, 3739, 3742.
Kentucky	3249, 3262, 3364, 3529, 3542, 3577, 3590, 3598, 3633, 3679, 3686, 3694, 3703, 3711, 3712, 3729, 3734.
Louisiana	3275, 3311, 3318, 3351, 3384, 3386, 3414, 3435, 3446, 3642, 3652, 3702.
Maine	3291, 3663.
Maryland	3385, 3443, 3572, 3667, 3700.
Massachusetts	3243, 3257, 3280, 3320, 3361, 3485, 3625.
Michigan	3270, 3368, 3429, 3448, 3469, 3483, 3504, 3548, 3692, 3723.
Minnesota	3555, 3578, 3612, 3628, 3691, 3695, 3772.
Mississippi	3526, 3594.
Missouri	3341, 3374, 3394, 3399, 3401, 3422, 3432, 3461, 3502, 3563, 3587.
Montana	3299, 3339, 3373, 3581, 3601, 3618, 3619.
Nebraska	3239, 3247, 3396, 3403, 3571, 3603, 3616, 3661, 3724, 3767, 3771.
Nevada	3375, 3377, 3743.
New Hampshire	3383, 3736, 3761.
New Jersey	3424, 3428, 3458, 3472, 3543, 3709.
New Mexico	3252, 3393, 3408, 3444, 3454, 3596, 3660, 3682, 3690, 3716, 3717, 3755, 3768.
New York	3263, 3279, 3290, 3295, 3302, 3309, 3326, 3332, 3334, 3355, 3366, 3367, 3372, 3380, 3387, 3400, 3420, 3439, 3459, 3462, 3465, 3473, 3477, 3487, 3489, 3501, 3503, 3510, 3553, 3599, 3623, 3645, 3675, 3687, 3710, 3753, 3770.
North Carolina	3269, 3288, 3312, 3315, 3362, 3379, 3427, 3507, 3512, 3515, 3564, 3731, 3754.
North Dakota	3720, 3738, 3756, 3766.
Ohio	3282, 3283, 3284, 3307, 3329, 3382, 3402, 3417, 3452, 3492, 3496, 3541, 3584, 3615, 3629, 3649, 3662, 3688, 3697, 3775.
Oklahoma Territory	3395, 3470, 3537, 3544, 3672, 3752.
Oregon	3416, 3453, 3484, 3499, 3506, 3508, 3533, 3562, 3624, 3758.

Index to list of specimens received for examination and report, etc.—Continued.

Source.	Record number of lots.
North America—Continued.	
United States—Continued.	
Pennsylvania	3236, 3271, 3293, 3300, 3319, 3328, 3354, 3378, 3413, 3436, 3437, 3440, 3450, 3479, 3490, 3511, 3514, 3525, 3570, 3592, 3644, 3671, 3674, 3733, 3748, 3750, 3776.
Rhode Island	3304.
South Carolina	3258, 3404, 3421, 3497, 3547, 3582, 3646, 3777.
South Dakota	3254, 3298, 3308, 3407, 3433, 3434, 3540, 3764.
Tennessee	3238, 3303, 3305, 3342, 3430, 3445, 3531, 3558, 3559, 3706, 3732.
Texas	3244, 3250, 3260, 3277, 3301, 3324, 3331, 3337, 3398, 3426, 3494, 3495, 3535, 3556, 3557, 3580, 3622, 3650, 3678, 3684, 3693, 3701, 3725, 3737, 3740.
Utah	3246, 3348, 3456, 3505, 3523, 3528, 3550, 3575, 3583, 3588, 3597, 3605, 3621, 3651, 3653, 3657, 3665, 3683, 3698, 3715, 3726, 3730.
Vermont	3655.
Virginia	3251, 3264, 3276, 3281, 3306, 3316, 3335, 3340, 3356, 3363, 3392, 3409, 3442, 3500, 3549, 3573, 3608, 3620, 3626, 3708, 3714, 3747, 3759.
Washington	3255, 3272, 3289, 3294, 3296, 3317, 3350, 3552, 3365, 3381, 3389, 3412, 3464, 3488, 3518, 3565, 3589, 3602, 3636, 3639, 3713, 3719, 3763, 3769.
West Virginia	3241, 3273, 3405, 3438, 3524, 3604, 3669, 3696.
Wisconsin	3475, 3566, 3611, 3635, 3722.
Wyoming	3388, 3585, 3659, 3677.
West Indies	3418, 3455, 3520, 3545, 3561, 3640, 3648.
South America	3292, 3343, 3353, 3359, 3741.
Europe	3369, 3476, 3568.
Oceanica	3245, 3345, 3647.

Number of lots of specimens referred to the departments in the Museum for examination and report.

Department.	Number of lots referred.
Mammals	5
Birds	52
Reptiles and batrachians	6
Fishes	3
Mollusks	12
Insects	95
Marine invertebrates	17
Comparative anatomy	7
Paleontology	33
Botany	21
Minerals	67
Geology	160
Prehistoric anthropology	43
Ethnology	6
Arts and industries	22

APPENDIX VII.

Lectures and Meetings of Societies.

PAPERS READ AT THE ELEVENTH ANNUAL MEETING OF THE AMERICAN HISTORICAL ASSOCIATION, DECEMBER 26, 27, 1895.

A Defense of Representative Government. Hon. George F. Hoar.
The Critical Methods of Leopold von Ranke. Prof. E. G. Bourne.
Arent Van Curler and his Journal of 1634. General James Grant Wilson.
Raleigh's Colony and its Present Remains. Talcott Williams.
How far was Primeval Man a Modern Savage? Talcott Williams.
A Classification of Colonial Government. Prof. H. L. Osgood.
The Electoral College for the Senate of Maryland. Dr. B. C. Steiner.
The Struggle of Democracy *versus* Aristocracy in Virginia in 1830. Dr. Jeffrey R. Brackett.
The Political Activity of Massachusetts Towns during the Revolution. H. A. Cushing.
The Land System of Provincial Pennsylvania. William R. Shepherd.
Colonial Structure in North Carolina. Dr. S. B. Weeks.
The Agreement of 1817 Concerning the Reduction of Naval Forces Upon the Great Lakes. J. M. Callahan.
The Political Aspects of the Homestead Law Agitation. Prof. B. S. Terry.
Light on the Underground Railroad. Prof. W. H. Siebert.
Historical Testimony. Dr. James Schouler.
Commodore John Barry. Martin I. J. Griffin.
Part and Place of Governor Edward Winslow in Plymouth Colony. Rev. Dr. W. C. Winslow.
Locating the Capital. Gaillard Hunt.
The Manuscript Journals of the Continental Congress. Dr. Herbert Friedenwald.
A Plea for the Study of the History of Northern Europe. Dr. A. C. Coolidge.
The German Imperial Court. Oswald G. Villard.
The French Revolution as Seen by the Americans of the Eighteenth Century. Prof. Charles D. Hazen.
The French in Mexico and the Monroe Doctrine. Dr. Frederic Bancroft.

PROGRAMME OF THE MEETING OF THE NATIONAL SCIENCE CLUB, JANUARY 3, 1896.

I. Lake Studies. Mrs. R. S. Eigenmann. (Read by Mrs. Barton W. Evermann.)
II. Sense Organs of *Lumbricus agricola*. Miss Fannie E. Langdon.
III. Fermentation in Bread; Growth of Plants. Miss Katherine E. Golden.
IV. Geology of Waverly, N. Y. Miss Marian B. Shepard.
V. Quincy Granite of Massachusetts. Miss A. H. Gardner.
VI. The Trees, Our Friends. Miss H. B. Bailey. (Read by Mrs. Harriett D. Mitchell.)
VII. The Beauties and Mysteries of Nature as Revealed by the Microscope. Mrs. M. A. Booth.
VIII. Yellow-fringed Orchis. Miss E. J. Hasbrouck.
IX. Adaptation of Seeds and Fruits for Dissemination. Miss M. F. Boynton.
X. Common Orchids of Northwestern Massachusetts. Miss Dora A. Radlo. (Read by Mrs. M. H. Weldon.)

PAPERS ENTERED TO BE READ AT THE MEETING OF THE NATIONAL ACADEMY OF SCIENCES IN APRIL, 1896.

I. The Geological Efficacy of Alkali Carbonate Solutions. E. W. Hilgard.
II. On the Color Relations of Atoms, Ions, and Molecules. M. Carey Lea.
III. On the Characters of the Otocœlidæ. Prof. E. D. Cope.
IV. Exhibition of a Linkage whose Motion Shows the Laws of Refraction of Light. A. M. Mayer.
V. Location in Paris of the Dwelling of Malus, in which he made the Discovery of the Polarization of Light and Reflection. A. M. Mayer.
VI. (1) On Experiments showing that the X-Rays can not be Polarized by passing through Herapathite.
(2) The Density of Herapathite.
(3) Formulæ of Transmission of the X-Rays through Glass, Tourmaline and Herapathite. A. M. Mayer.
VII. On the X-Rays from a Statical Current Produced by a Rapidly Revolving Leather Belt. W. A. Rogers and Frederick Brown.
VIII. Biographical Memoir of James Edward Oliver. G. W. Hill.
IX. Biographical Memoir of Charles Henry Davis. C. H. Davis.
X. Biographical Memoir of George Engelmann. Dr. C. A. White.
XI. Legislation Relating to Standards. T. C. Mendenhall.
XII. On the Determination of the Coefficient of Expansion of Jessop's Steel, between the limits 0° and 64° C., by the Interferential Method. E. W. Morley and W. A. Rogers.
XIII. On the separate Measurement, by the Interferential Method, of the Heating Effect of Pure Radiations and of an Envelope of Heated Air. W. A. Rogers.
XIV. On the Logic of Quantity. C. S. Peirce.
XV. Judgment in Sensation and Perception. Maj. J. W. Powell.
XVI. The Variability in Fermenting Power of the Colon Bacillus under Different Conditions. A. W. Peckham.
XVII. Experiments on the Reflection of the Röntgen Rays. O. N. Rood.
XVIII. Notes on Röntgen Rays. Prof. H. A. Rowland.
XIX. Some Studies in Chemical Equilibrium. Ira Remsen.
XX. The Decomposition of Diazo-compounds by Alcohol. Ira Remsen.
XXI. On Double Halides containing Organic Bases. Ira Remsen.
XXII. Results of Researches of Forty Binary Stars. T. J. J. See.
XXIII. On a Remarkable New Family of Deep-sea Cephalopoda and its bearing on Molluscan Morphology. Prof. A. E. Verrill.
XXIV. The Question of the Molluscan Archetype, or Archi-mollusk. Prof. A. E. Verrill.
XXV. On some points in the Morphology and Phylogeny of the Gastropoda. Prof. A. E. Verrill.
XXVI. Source of X-Rays. A. A. Michelson and S. W. Stratton.
XXVII. The Relative Permeability of Magnesium and Aluminum to the Röntgen Rays. A. W. Wright.
XXVIII. The State of Carbo-dioxide at the Critical Temperature. C. Barus.
XXIX. The Motion of a Submerged Thread of Mercury. C. Barus.
XXX. On a Method of Obtaining Variable Capillary Apertures of Specified Diameter. C. Barus.
XXXI. On a New Type of Telescope Free from Secondary Color. C. S. Hastings.
XXXII. The Olindiadæ and other Medusæ. W. K. Brooks.
XXXIII. Budding in Perophora. W. K. Brooks and George Lefevre.
XXXIV. Anatomy of Yoldia. W. K. Brooks and Gilman Drew.
XXXV. On the *Pithecanthropus erectus* from the Tertiary of Java. Prof. O. C. Marsh.

TITLES OF SATURDAY LECTURES FOR 1896.

COURSE 1.

March 21.—The Battle of the Forest. Dr. B. E. Fernow.
March 28.—The Adaptation of Plants to the Desert. F. V. Coville.
April 4.—The Spread of the Rabbit. T. S. Palmer.
April 11.—Insect Mimicry. L. O. Howard.
April 18.—The Persistence of Functionless Structures. F. A. Lucas.

COURSE 2.

April 25.—Relation of Primitive Peoples to Environment, illustrated by American examples. Maj. J. W. Powell.
May 2.—The Dependence of Industrial Arts on Environment. Prof. O. T. Mason.
May 9.—The Japanese Nation—a Typical Product of Environment. Gardiner G. Hubbard.
May 16.—The Tusayan Ritual: A Study of the Influence of Environment on Aboriginal Cults. Dr. J. Walter Fewkes.
May 23.—The Relation between Institutions and Environment. W J McGee.

APPENDIX VIII.

Finance, Property, Supplies, and Accounts.

APPROPRIATIONS FOR THE FISCAL YEAR ENDING JUNE 30, 1896.

For continuing the preservation, exhibition, and increase of the collections from surveying and exploring expeditions of the Government and from other sources, including salaries or compensation of all employees	$143,225
For cases, furniture, fixtures, and appliances required for the exhibition and safekeeping of the collections of the National Museum, including salaries or compensation of all necessary employees	12,500
For expense of heating, lighting, electrical, telegraphic, and telephonic service for the National Museum	13,000
For postage stamps and foreign postal cards for the National Museum	500
For repairs to buildings, shops, and sheds, National Museum, including all necessary labor and material	4,000
For rent of workshops for the National Museum	900
For the Smithsonian Institution, for printing labels and blanks and for the Bulletins and annual volumes of the Proceedings of the National Museum, and binding scientific books and pamphlets presented to and acquired by the National Museum library	12,000
For expense of constructing four additional fire plugs in the Smithsonian grounds for the better protection of the Smithsonian Institution, National Museum, and Astro-Physical Observatory, and the purchase of necessary fire hose	800

FUNDS TO THE CREDIT OF THE MUSEUM JULY 1, 1895.

Appropriation for 1894 (balance), $236.12; appropriation for 1895 (balance), $7,159.21; appropriation for 1896, $186,925.00; making a total of $194,320.33. This amount was divided as follows:

Preservation of collections:		
1894	$235.27	
1895	4,950.88	
1896	143,225.00	
		$148,411.15
Furniture and fixtures:		
1894	.09	
1895	697.43	
1896	12,500.00	
		13,197.52
Heating and lighting:		
1894	76	
1895	1,445.07	
1896	13,000.00	
		14,445.83
Building repairs:		
1895	13.29	
1896	4,000.00	
		4,013.29
Rent of workshops:		
1895	52.54	
1896	900.00	
		952.54
Fire protection, 1896		800.00
Postage, 1896		500.00
Printing and binding, 1896		12,000.00
Total		194,320.33

DISBURSEMENTS FROM UNEXPENDED BALANCES OF APPROPRIATIONS FOR 1894 AND 1895.

Appropriation for 1894.—Preservation of collections, $227.87. No other claim having been presented against this appropriation, the balance remaining ($7.40), together with the balances of the appropriations for furniture and fixtures ($0.09), and heating and lighting ($0.76)—in all, $8.25, will revert into the Treasury, to be carried to the credit of the surplus fund, under the provisions of section 3690 of the Revised Statutes.

Appropriation for 1895.—Preservation of collections, $4,908.57; furniture and fixtures, $696.90; heating and lighting, $1,443.92; building repairs, $8.51; rent of workshops, $40.

DISBURSEMENTS UNDER THE APPROPRIATIONS FOR THE FISCAL YEAR ENDING JUNE 30, 1896.

Preservation of collections	$140,378.47
Furniture and fixtures	11,184.91
Heating and lighting	12,052.67
Postage	500.00
Repairs to buildings	3,070.49
Rent of workshops	825.00
Fire protection	798.29

UNEXPENDED BALANCES REMAINING ON HAND JUNE 30, 1896.

The expenditures from the appropriations for the fiscal years ending June 30, 1895 and 1896, respectively, leave the following unexpended balances, which will be applied to the liquidation of outstanding indebtedness created within those years: Fiscal year 1895, $61.31; fiscal year 1896, $6,115.17.

These balances are divided as follows:

Appropriation for 1895.—Preservation of collections, $42.31; furniture and fixtures, $0.53; heating and lighting, $1.15; building repairs, $4.78; rent of workshops, $12.54; total, $61.31.

Appropriation for 1896.—Preservation of collections, $2,846.53; furniture and fixtures, $1,315.09; heating and lighting, $947.33; repairs to buildings, $929.51; rent of workshops, $75; fire protection, $1.71; total, $6,115.17.

The disbursements under the appropriation for printing and binding aggregated $11,947.29, leaving an unexpended balance of $52.71.

APPENDIX IX.

Statement of the Distribution of Specimens During the Year Ending June 30, 1896.

AMERICA.

NORTH AMERICA.

Canada.

New Brunswick:

Natural History Society of New Brunswick, St. Johns: Casts of prehistoric stone implements (106 specimens, set 55). Gift. (D.10009.)

Ontario:

Billings, Walter R., Ottawa: Fossils (51 specimens). Exchange. (D. 9937.)

Brooks, W. E., Mount Forest: Warblers (42 specimens); birds' skins (3 specimens). Lent for study. (D. 9288, 9597.)

Currie, Hector, Thedford: Fossils (39 specimens). Exchange. (D. 9520.)

Grant, C. C., Hamilton: Fossils and shells (493 specimens). Exchange. (D. 9536.)

Howard, S. W., Hagersville: Fossils (59 specimens). Exchange. (D. 9223.)

Kearney, N. J., Thedford: Fossils (31 specimens). Exchange. (D. 9521.)

Kernahan, George, Thedford: Fossils (32 specimens). Exchange. (D. 9522.)

Quebec:

Dawson, Sir William, Montreal: Fossil sponges (3 specimens). Exchange. (D. 9859.)

United States.

Alabama:

Polytechnic College and Ladies' Institute, Cullman: Rocks and ores (96 specimens, set 91). Gift. (D. 9386.)

Arkansas:

Arkansas Industrial University, Fayetteville: Set alcoholic fishes (229 specimens); set alcoholic fishes (1,176 specimens). Gift. (D. 9930, 9485.)

Arkansas—Continued.

McNeill, Jerome, Fayetteville: Acridiidæ (24 specimens). Lent for study. (D. 9596.)

California:

Crowfoot, Miss Jessie, San Miguel: Atlantic coast marine shells (161 specimens). Exchange. (D. 9226.)

Falls, H. C., Pomona: Specimens of insects. Lent for study. (D. 9711.)

Gilbert, C. H., Stanford University: One specimen of *Larimus breviceps.* Lent for study. (D. 9918.)

Leland Stanford Junior University, Stanford University: Collection of alcoholic fishes (1,539 specimens); specimen of *Chasmistes liorus;* collection of alcoholic fishes (81 specimens). Gift. (D. 9487, 9698, 9932.)

Matthiessen, A. H., San Diego: Fossils (67 specimens). Exchange. (D. 9848.)

State University of California, Berkeley: Fossils (4 specimens). Gift. (D. 9806.)

Stephens, F., Witch Creek: Bird's skin. Lent for study. (D. 9215.)

Van Denburgh, John, San Francisco: Specimen of reptile. Lent for study. (D. 9684.)

Colorado:

Baker, Carl F., Fort Collins: Jassidæ (1,476 specimens). Lent for study. (D. 9831, 9881.)

Gillette, C. P., Fort Collins: Specimens of Cynipidæ. Exchange. *Typhlocybini* (273 specimens). Lent for study. (D. 9539, 9584.)

University of Denver, University Park: Marine invertebrates (464 specimens, set 42, Series V). Gift. (D. 9781.)

CONNECTICUT:

Peabody Museum, New Haven: Starfishes (88 specimens). Exchange. Starfishes (306 specimens). Lent for study. (D. 9941.)

DAKOTA:

North Dakota Agricultural College, Fargo, N. Dak.: Alcoholic fishes (81 specimens). Gift. (D. 9713.)

DISTRICT OF COLUMBIA:

Academy of the Sacred Heart of Mary, Washington: Casts of prehistoric implements (106 specimens, set 48); rocks and ores (96 specimens, set 87); minerals (60 specimens). Gift. (D. 9372, 9424, 9969.)

Central High School, Washington: Fragments of rocks and ores. Gift. (D. 9464.)

Columbian University, Washington: Collection of rocks and ores. Gift. (D 10004.)

Hornung, J., Washington: Birds' skins (68 specimens). Exchange. (D. 9333.)

Karlsive, W. J., Washington: Specimens of *Amblychila cylindriformis*. Exchange. (D. 9825.)

Matthews, Washington, Washington: Skin of Kit Fox. Lent for study. Brass plate from Morocco. Exchange. (D. 9404, 9615.)

Stevenson, Mrs. M. C., Washington: Birds' skins (96 specimens). Exchange. (D. 10046.)

Stone, George W., Washington: Cretaceous fossils (21 specimens). Exchange. (D. 9448.)

GEORGIA:

Demorest Normal School, Demorest: Rocks and ores (93 specimens, set 93). Gift. (D. 9368.)

Gordon Institute, Barnesville: Rocks and ores (98 specimens, set 79). Gift. (D. 9732.)

Lucy Cobb Institute, Athens: Rocks and ores (set 81.) Gift. (D. 9714.)

Rogan, Mrs. J. P., Cartersville: Specimens of Indian pottery. Exchange. (D. 9803.)

Spellman Seminary, Atlanta: Corals and crabs (41 specimens). Gift. (D. 10033.)

IDAHO:

State University of Idaho, Moscow: Alcoholic fishes (207 specimens); collection of rocks (92 specimens, set 97); marine invertebrates (540 specimens, set 200, Series IV). Gift. (D. 9218.)

ILLINOIS:

Barnes, W., Decatur: Lepidoptera (121 specimens). Exchange. (D. 9591.)

Field Columbian Museum, Chicago: Birds' skins (7 specimens). Lent for study. Set of alcoholic fishes (106 specimens). Exchange. (D. 9377, 9532, 9942.)

Holmes, Samuel J., Chicago: Two specimens of *Dermaturus mandti*. Exchange. (D. 9547).

University of Chicago, Chicago: Rocks. Exchange. (D. 9961.)

INDIANA:

City High School, Terre Haute: Set of alcoholic fishes (153 specimens). Gift. (D. 9933.)

High School, Washington: Rocks and ores (93 specimens, set 94). Gift. (D. 9751.)

Indiana University, Bloomington: Fishes collected by the U. S. Fish Commission (1,270 specimens). Fishes from the North Pacific collected by the U. S. Fish Commission steamer *Albatross* (226 specimens). Gift. (D. 9479, 9891.)

IOWA:

Amity College, College Springs: Marine invertebrates (500 specimens, set 38, Series V). Gift. (D. 9630.)

Buena Vista College, Storm Lake: Rocks and ores (98 specimens, set 75). Gift. (D. 9979.)

Calhoun County Normal School, Rockwell City: Rocks and ores (98 specimens, set 84). Gift. (D. 9655.)

Historical Department of Iowa, Des Moines: Set of alcoholic fishes (100 specimens). Gift. (D. 9239.)

Iowa University, Iowa City: Alcoholic fishes collected by the U. S. Fish Commission (652 specimens). Gift. (D. 9481.)

IOWA—Continued.

Public schools, Fonda: Rocks and ores (98 specimens, set 78). Gift. (D. 9856.)

Public schools, Spencer: Minerals (57 specimens, set 187). Gift. (D. 9607.)

St. Xavier's Academy, Manchester: Rocks and ores (96 specimens, set 86); minerals (57 specimens, set 186). Gift. (D. 9588.)

Upper Iowa University, Fayette: Set of alcoholic fishes (111 specimens); rocks and ores (98 specimens, set 74); casts of prehistoric implements (106 specimens, set 56); minerals (57 specimens, set 189); marine invertebrates (436 specimens, set 53). Gift. (D. 10042.)

KANSAS:

Crevecœur, F. F., Onaga: Shells (32 specimens). Exchange. Insects (4 specimens). Lent for study. (D. 9757, 9646.)

Kansas State Agricultural College, Manhattan: Rocks and ores (98 specimens, set 80). Gift. (D. 9725.)

Washburn College, Topeka: Rocks and ores (98 specimens, set 76). Gift. (D. 9980.)

KENTUCKY:

Ulrich, E. O., Newport: Collection of fossils. Lent for study. (D. 9441.)

LOUISIANA:

Frierson, Lorraine S., Frierson's Mill: Unios (20 specimens). Exchange. (D. 9647.)

MAINE:

Allen, Pardon, Auburn: Ethnological material (18 specimens); stone implements (38 specimens); specimen of wood carving, from Indians of southeast Alaska. Exchange. (D. 9356, 9503.)

Damon, W. P., West Auburn: Minerals and ores (16 specimens); stone implements and pottery (34 specimens). Exchange. (D. 9670.)

Westbrook Society of Natural History: Marine invertebrates (428 specimens, set 54, series V). Gift. (D. 9681.)

MARYLAND:

Donell-Smith, J., Baltimore: Guatemalan plants (377 specimens). Lent for study. (D. 10043.)

Murray, N., Baltimore: Astrolabe. Lent for study. (D. 9653.)

School for Blind Children, Baltimore: Mounted mammals (10 specimens). Gift. (D. 9960.)

Shriver, Howard, Cumberland: Fossils (227 specimens). Exchange. (D. 9531.)

Woman's College, Frederick: Small collection of Foraminifera, lobsters and one crab. (D. 9405.)

MASSACHUSETTS:

Bangs, Outram, Cambridge: Five specimens of *Putorius*. Lent for study. (D. 9577.)

City Library Association, Springfield: Casts of prehistoric implements (106 specimens, set 54). Gift. (D. 10008).

Dale, T. Nelson, Williamstown: Rock sections from New York and Vermont (67 specimens). Lent for study. (D. 9412.)

Faxon, Walter, Cambridge: Weasels (187 skins and 37 skulls); *Cambarus pellucidus testii* (3 specimens). Lent for study. (D. 9298, 9327.)

Hyatt, Alpheus, Cambridge: Fossils (10 specimens). Lent for study. (D. 9695.)

Jackson, Robert T., Cambridge: Fossils (3 species). Lent for study. (D. 9524.)

Massachusetts Institute of Technology, Boston: Geological material (91 specimens). Exchange. (D. 9694.)

Museum of Comparative Zoology, Cambridge: Fishes collected by the U. S. Fish Commission (1,636 specimens). Gift. Set of fishes from the North Pacific, collected by the U. S. Fish Commission steamer *Albatross*. Exchange. (D. 9684, 9878.)

Robinson, Wirt, Cambridge: Birds' skins (3 specimens). Exchange. (D. 9750.)

Samson, Albert A., West Medford: Pottery (7 specimens). Exchange. (D. 9798.)

MASSACHUSETTS—Continued.

Scudder, S. H., Cambridge: Orthoptera (25 specimens). Exchange. (D. 9667.)

Sturtevant, E. Lewis, South Birmingham: Specimens of charred corn. Lent for study. (D. 9576.)

MICHIGAN:

Arnold, Edward, Battlecreek: Birds' eggs (21 specimens). Exchange. (D. 9642.)

Davis, G. C., Agricultural College Post-Office: Tryphominæ (138 specimens). Lent for study. (D. 9938.)

Hope College, Holland: Casts of prehistoric implements (106 specimens, set 52). Gift. (D. 9780.)

St. Mary's Academy, Monroe: Casts of prehistoric implements (106 specimens, set 51). Gift. (D. 9756.)

MINNESOTA:

Central High School, Duluth: Fishes collected by the U. S. Fish Commission (616 specimens). Set of alcoholic fishes (136 specimens). Gift. (D. 9483, 9927.)

High School, Winona: Rocks and ores (96 specimens, set 90). Gift. (D. 9385.)

State Normal School, Mankato: Collection of alcoholic fishes (1,327 specimens). Set of alcoholic fishes (146 specimens). Gift. (D. 9480, 9931.)

MISSOURI:

University of Missouri, Columbia: Collection of fishes (95 specimens, set 101). Gift. (D. 9243.)

MONTANA:

Montana Academy of Agriculture and Mechanic Arts, Bozeman: Fishes (77 specimens, set 107); minerals (57 specimens, set 185). Gift. (D. 9490.)

University of Montana, Missoula: Duplicate fishes (85 specimens, set 105). Gift. (D. 9275.)

NEBRASKA:

Gates College, Neligh: Rocks and ores (96 specimens, set 89). Gift. (D. 9384.)

State University, Lincoln: Collection of alcoholic fishes (730 specimens). Gift. (D. 9482.)

NEW JERSEY:

Smith, John B., New Brunswick: Two specimens representing the genus *Agrotis;* Noctuids (175 specimens). Lent for study. (D. 9493, 9659.)

NEW MEXICO:

Cockerell, T. D. A., Lascruces: Insects (45 specimens). Lent for study. (D. 9805.)

NEW YORK:

Allen, J. A., New York: Birds' skins (70 specimens). Exchange. (D. 9526.)

Beutenmuller, William, New York City: Insects (16 specimens). Lent for study. (D. 9804, 9976.)

Bishop, H. R., New York: Fragment of febrolite hatchet from Brittany. Exchange. Stone implements (3 specimens). Lent for study. (D. 9535, 9765.)

Boas, Franz, New York: Ten human skulls. Lent for study. (D. 9707.)

Brown, Mrs. M. E., New York: Nine musical instruments. Exchange. (D. 9627, 9723.)

Chapman, Frank M., New York: Birds' skins (49 specimens). Lent for study. (D. 9561, 9568.)

Clarke, J. M., Albany: Cephalopods (139 specimens). Lent for study. (D. 9693.)

Cook, O. F., Huntington, L. I.: Myriapods (100 specimens). Lent for study. (D. 9902.)

Elmira College, Elmira: Foraminifera. Gift. (D. 9440.)

Farley, Thomas J., New York: Stone implements (17 specimens). (D. 9608.) For study.

Franklin, T. W., New York: Skin of elephant; pair of bison horns. Exchange. (D. 9925, 9963.)

Glen Island Museum, Glen Island: Ethnological specimens, including 1 blanket and 5 pairs of Chinese sandals. Exchange. (D. 9513, 9832.)

Harris, G. D., Ithaca: Collection of Midway fossils. Lent for study. (D. 9426).

Hatcher, J. B., New York: Five skulls of mammals. Lent for study. (D. 9611.)

NEW YORK—Continued.

Osborn, Henry F., New York: Fossils (18 specimens). Lent for study. (D. 9644).

Phillips, Barnett, Brooklyn: Two pieces of pottery. Exchange. (D. 9827.)

St. Bernard Seminary, Rochester: Plants (104 specimens); rocks and ores (98 specimens, set 83). Gift. (D. 9712).

Schuyler, E. O., New York: Baskets obtained from the North American Indians and the natives of Polynesia (10 specimens). Exchange. (D. 9896, 9990, 10032.)

Teachers' College, Riverside Heights: Piece of Samoan cloth, and an ornamented mat from Africa. Gift. (D. 9676.)

Ward's Natural Science Establishment, Rochester: Trilobites (366 specimens). Exchange. (D. 9898.)

White, Theodore G., New York: Twenty-five rock sections. Lent for study. (D. 9409.)

Williamsburg Scientific Society, Brooklyn: Minerals (7 specimens). Exchange. (D. 9820).

Woodward, A., New York: Fossil Foraminifera. Lent for study. (D. 9682.)

Workingmen's School, New York City: Casts of prehistoric implements (100 specimens, set 47); ethnologica (90 specimens); pottery (12 specimens). Exchange. (D. 9334, 9562).

Wortman, J. L., New York: Skull of *Dendrohyrax validus*. Lent for study. (D. 9688.)

OHIO:

Adelbert College, Cleveland: Alcoholic fishes (94 specimens, set 94). Gift. (D. 9244.)

Case School of Applied Sciences, Cleveland: Marine invertebrates (222 specimens). Gift. (D. 9754.)

Case, H. B., Loudenville: Fossils (12 specimens). Exchange. (D. 9760.)

Oberlin College, Oberlin: Collection of alcoholic fishes (443 specimens). Gift. (D. 9486.)

OHIO—Continued.

Ohio State University, Columbus: Rocks and ores (92 specimens, set 95). Gift. (D. 9229.)

Ohio Wesleyan University, Delaware: 12 vials of Foraminifera. Lent for study. (D. 9478.)

St. Mary's of the Springs, Shepard: Birds' skins (93 specimens). Gift. (D. 9204.)

Vickers, E. W., Ellsworth: Skin of field mouse. Exchange. (D. 9676.)

OREGON:

Oregon State University, Eugene: Alcoholic fishes (215 specimens); marine invertebrates (464 specimens, set 41, Series V). Gift. (D. 9928, 9755.)

PENNSYLVANIA:

Clapp, George H., Pittsburg: Unios (3 species). Exchange. (D. 9369.)

Converse, G. G., South Bethlehem: Collection of deep-sea soundings, made by the U. S. Fish Commission steamer *Albatross* in the North Atlantic. Lent for study. (D. 9793.)

Eakins, Thomas, Philadelphia: Shield, quiver, bow, and lance. Lent for study. (D. 9413.)

Fox, William J., Philadelphia: Collection of *Monedula* (98 specimens); collection of wasps. Lent for study. (D. 9234, 9396.)

Holland, W. J.: Lepidoptera (412 specimens). Lent for study. African Lepidoptera (6 specimens). Exchange. (D. 9599, 9818.)

Johnson, J. R., Pittsburg: Collection of stone implements, shell beads, and plaster casts. Exchange. (D. 9906.)

Klages, Henry G., Jeannette: Coleoptera (100 specimens). Exchange. (D. 9762.)

Lacoe, R. D., Pittston: Unios (21 specimens). Exchange. (D. 9702.)

Philadelphia Normal School, Philadelphia: Marine invertebrates (988 specimens, sets 39 and 40, Series V); minerals (57 specimens, set 188). Gift. (D. 9705.)

Randall, F. A., Warren: Fossils and shells (25 specimens). Exchange. (D. 9880.)

PENNSYLVANIA—Continued.

Rhoads, S. N., Philadelphia: Skins and skulls of hares. Lent for study. (D. 9605, 9654.)

Skinner, Henry, Philadelphia: Butterflies (3 specimens). Exchange. (D. 9518.)

Stone, Witmer, Philadelphia: Birds' skins (75 specimens). Lent for study. (D. 9501, 9649.)

The Philadelphia Museum, City Hall, Philadelphia: Fishes (86 specimens, set 104). Gift. (D. 9276.)

Wagner Free Institute, Philadelphia: Fossil fishes (12 specimens). Exchange. (D. 9761.)

RHODE ISLAND:

Brown University, Providence: Model of *Archæopteryx*. Gift. (D. 9541.)

Carr, Silas, Jamestown: Minerals (6 specimens; arrowheads and spearheads (16 specimens). Exchange. (D. 9657, 9889.)

SOUTH CAROLINA:

Mazyck, W. G., Charleston: Shells (18 specimens). Exchange. (D. 9851).

Wayne, Arthur T., Mount Pleasant: Birds' skins. Exchange. (D. 9609.)

TEXAS:

Grayson College, Whitewright: Minerals (57 specimens, set 184); rocks and ores (96 specimens, set 88). Gift. (D. 9414.)

VIRGINIA:

Hutchinson, W. F., Winchester: Birds' skins. Exchange. (D. 9993.)

Virginia Normal and Collegiate Institute, Petersburg: Rocks and ores (92 specimens). Gift. (D. 9220.)

WASHINGTON:

Dennison, George W., Friday Harbor, San Juan Island: Bones of Great Auk. Exchange. (D. 9425.)

Fuller, William H., Fairhaven: Rocks (12 specimens). Exchange. (D. 10028.)

Olds, Fred. W., Wenatchee: Specimen of cryolite. Exchange. (D. 9312.)

University of Washington, Seattle: Collection of alcoholic fishes from the North Pacific (202 specimens); rocks and ores (98 specimens, set 77); set of alcoholic fishes (306 specimens). Gift. (D. 9877, 9879, 9934.)

WISCONSIN:

Lewis, C. H., Brodhead: Specimen of stone ax. Exchange. (D. 9726.)

Sacred Heart Academy, Madison: Rocks and ores (94 specimens, set 93); prehistoric implements (106 specimens, set 48). Gift. (D. 9371.)

Sparta High School, Sparta: Rocks and ores (98 specimens, set 85). Gift. (D. 9715.)

West Side High School, Milwaukee: Rocks and ores (98 specimens, set 85.) Gift. (D. 9618).

SOUTH AMERICA.

Argentina.

La Plata Museum, La Plata: Alcoholic fishes (101 specimens, set 103); casts of prehistoric implements (106 specimens, set 46). Exchange. (D. 9264.)

Brazil.

Foetterle, J. G., Petropolis: Central and South American butterflies (78 specimens). Exchange. (D. 9975.)

Museo Paulista, São Paulo: Nine ethnological specimens. Exchange. (D. 9911.)

Chile.

Reed, Edwyn C., Rancagua: Butterflies (50 specimens). Exchange. (D. 9622.)

WEST INDIES.

Jamaica.

Jarvis, P. W., Kingston: Specimens of crabs. Exchange. (D. 9709.)

EUROPE.

Austria.

Imperial Royal Natural History Museum, Vienna: Plants (400 specimens). Exchange. (D. 9463.)

Royal Zoological Museum, Vienna: Collection of alcoholic fishes (121 specimens); collection of alcoholic fishes from the North Pacific (234 specimens). Exchange. (D. 9554, 9953.)

Belgium.

Botanical Gardens, Brussels: Collection of herbarium specimens. Lent for study. (D. 9904.)

Denmark.

Royal Zoological Museum, Copenhagen: Collection of alcoholic fishes (111 specimens). Exchange. (D. 9555.)

Berg, R., Copenhagen: Mollusks (5 specimens). Exchange. (D. 9830.)

England.

British Museum of Natural History, London: Collection of alcoholic fishes (115 specimens); collection of alcoholic fishes from the North Pacific (258 specimens); specimens of *Typhlomolze rathbuni*. Exchange. (D. 9552, 9952, 9995.

Chaster, G. W., Southport: Pyramidellidæ (39 specimens). Exchange. (D. 9565.)

Hewlett, S. G., Eastbourne: Arrowheads and spearheads (22 specimens). Exchange. (D. 9190.)

Mason, George E., London: Insects from the Mammoth Cave, Kentucky. Exchange. (D. 10029.)

Masters, Maxwell T., London: Plants (6 specimens). Exchange. (D. 9940.)

Norman, A. M., Burnmoor Rectory, Fence House, Durham: Crabs (39 specimens). Exchange. (D. 9572.)

Salford Borough Royal Museum and Library, near Manchester: Casts of prehistoric implements (106 specimens). Exchange. (D. 9958.)

Stebbing, T. R. R., Tunbridge Wells: Amphipods (2 specimens). Exchange. Amphipods (3 specimens). Lent for study. (D. 10047.)

Tring Museum, Tring: Birds' skins (2 specimens). Exchange. One bird skin. Lent for study. (D. 9973.)

University Museum of Zoology, Cambridge: Collection of Termites. Exchange. (D. 9355.)

France.

Crossman, M., Paris: Cretaceous Gastropods (6 specimens). Lent for study. (D. 9734.)

Koehler, R., Lyons: *Luidia elegans* (one specimen). Lent for study. (D. 9227.)

Museum of Natural History, Paris: Collection of alcoholic fishes (111 specimens); collection of alcoholic fishes from the North Pacific (211 specimens). Exchange. (D. 9551, 9951.)

Vignal, L., Paris: Tertiary fossils (75 specimens). Exchange. (D. 9544.)

Germany.

Fürbringer, Max, Jena: Specimen of *Polistotrema dombeyi*. Lent for study. (D. 9556.)

Jaekel, Otto, Berlin: Fossils (142 specimens). Lent for study. (D. 9810.)

Royal Botanic Gardens, Berlin: Dried plants (318 specimens). Lent for study. Dried plants (318 specimens). Exchange. (D. 9558.)

Royal Zoological Museum, Berlin: Set of duplicate fishes, mostly deep sea forms, from the Atlantic and Pacific Oceans (109 specimens); set of alcoholic fishes from the North Pacific Ocean (240 specimens). Exchange. (D. 9550, 9950.)

Hungary.

Chernelháza, Stefan Chernel von, Köszeg: Three birds' skins. Exchange. Three birds' skins. Lent for study. (D. 9418.)

Italy.

Bomes, O., Fortici: Herbarium material (134 specimens). Lent for study. (D. 9241.)

Royal Zoological Museum, Florence: One specimen of *Mytillus californicus;* alcoholic bats (250 specimens); two skins of *Neürotrichus*, with skulls. Exchange. (D. 9968.)

University of Pisa, Pisa: Collection of American fishes (93 specimens); specimen of *Pentacrinus decorus;* alcoholic fishes (122 specimens); specimens of crinoids. Exchange. (D. 9321, 9769.)

Zoological Museum, Turin: Crustaceans (25 specimens). Exchange. (D. 9736.)

Norway.

Royal Zoological Museum, Christiania: Collection of alcoholic fishes (107 specimens); collection of alcoholic fishes from the North Pacific. (279 specimens.) Exchange. (D. 9553, 9954.)

Russia.

University of Moscow, Moscow: Cretaceous fossils (29 specimens). Exchange. (D. 9779.)

Scotland.

Nicholson, H. A., Aberdeen: Graptolites (24 specimens). Exchange. (D. 9557.)

Sweden.

Tornquist, S. L., Lund: Graptolites (60 specimens). Exchange. (D. 5940.)

University of Stockholm, Stockholm: Specimens of *Pentacrinus decorus* and *P. mülleri*. Exchange. (D. 9735.)

ASIA.

China.

St. John's College, Shanghai: Casts of prehistoric implements (106 specimens, set 50); plants (120 specimens). Exchange. (D. 9582.)

OCEANICA.

Australia.

New South Wales:

Australian Museum, Sydney: Mounted skin and rough skeleton of opossum; 53 photographs of shells collected by the Wilkes Exploring Expedition; 2 skeletons of turtles. Exchange. (D. 9606, 9716, 9800.)

Carney, Joseph J.: Petroleum, rocks, and sands (21 specimens). Exchange. (D. 9564.)

South Australia:

Bradley, Edgar J., Happy Valley Water Works: Specimens of *Rhabdammina abyssorum* and Foraminifera. Exchange. (D. 9897.)

New Zealand.

Canterbury Museum, Christchurch: Pueblo pottery (31 specimens). Exchange. (D. 9763.)

APPENDIX X.

The Work of the Mechanics and Laborers.

The following is an abstract of the report of the superintendent of buildings, Mr. Henry Horan, so far as it relates to the work of the mechanics and laborers.

1895.

July.—Repairs were made in the south tower and in other portions of the Smithsonian building. Several crates of cases were brought from storage and packed for shipment to the Cotton States and International Exposition at Atlanta. Exhibits from the departments of minerals and paleontology were shipped to the Exposition during the month. In the room adjoining the dynamo room the floor was lowered and a large brick column removed.

August.—The cases containing material for the Atlanta Exposition were placed in the storage sheds south of the Smithsonian building as soon as packed, to await shipment, and later 117 boxes and crates were forwarded. A number of push buttons, connected with the annunciator in the telephone room, were placed at different points in the Museum building. The collection of the section of physical apparatus was removed from the cases on the first floor of the south tower of the Smithsonian building, and a portion of the instruments placed on exhibition in the east hall of the Museum. Workmen were engaged for several days in taking the boats from the ceiling in the hall where they are exhibited, measuring them, and returning them to their former positions.

September.—The work of shipping exhibits to the Atlanta Exposition was completed early in the month. The lecture hall was thoroughly cleaned, new matting laid, etc. The sheds in the rear of the Smithsonian Institution were painted. New book-cases were made and placed in the office of the Assistant Secretary. In many places the worn-out floors of the Museum were taken up and replaced with new material. All the large cases were moved from the rotunda, and small ones containing models of cliff-dwellings placed therein. Several new fire-plugs were placed in the grounds near the buildings. A chimney-flue was constructed from the second floor to the roof of the northwest pavilion.

October.—The floors in the offices of the Assistant Secretary and chief clerk were planed and cleaned. Wires were run to connect a signal bell in the department of materia medica with the telephone room, and the wires running from the Museum to the Department of Agriculture were overhauled. The top of the old well south of the Smithsonian Institution was arched over with brick. A new telephone instrument was put up in the office of the superintendent. The doorway leading from the vestibule to the stairway on the first floor of the northwest pavilion was altered, the opening being enlarged to a wide archway. Steam pipes were run from the boilers in the Smithsonian building to the east end of the shed just outside. The telephone wires were disconnected from the overhead cable and connected to the underground cable. The vestibule of the northwest entrance was wainscoated.

November.—Two radiators were placed in one of the sheds, and the pipe coils altered and improved. Water pipes were also placed in the same shed and a sink constructed. The lecture hall was put in readiness for the meeting of the American Ornithologists' Union. A radiator was placed in one of the rooms adjoining

the east balcony. A workroom was fitted up for the plumber and pipe fitter. Incandescent electric lamps were put up in the coal vault and other cellars of the Museum. The work of painting the outside of the Museum building was commenced.

December.—Incandescent electric lamps were put up in the library. All the locks on the doors in the Museum were put in order, keys refitted, new ones made where necessary, and the records revised to correspond with the alterations and additions. The exhibition cases in the mineral hall were rearranged and four additional cases placed therein. The work of painting the outside of the Museum was continued; the walls in the east hall were also painted. The exhibition cases in the fisheries hall were rearranged. Two iron hitching-posts were placed at the east entrance of the Museum. A platform for the exhibition of certain large specimens was constructed in the east hall, and a heavy base for the serpent column of Delphi was made and set up.

1896.

January.—The lecture hall was put in order for the meeting of the National Science Club. An excavation was made in the basement of the Smithsonian building, and the space thus obtained, after having the floor and sides bricked up, was used for the reception of a small heating boiler. Six fire extinguishers were placed in different parts of the Museum building. Some additional cases were set up in the north hall. The fisheries hall was screened off for the reception of the exhibits returned from the Atlanta Exposition. The erection of a small gallery, to be used for storage cases for the herbarium, was commenced.

February.—Much time was spent during this month in receiving, making space for, unpacking, and setting up in their proper departments the exhibits returned from the Atlanta Exposition. The three cases containing the Copp collection of New England historical and domestic objects were removed from the north hall to the lecture hall, to be photographed. The work of putting up the gallery for the herbarium was completed, and work commenced on the cases to be placed thereon. A large group belonging to the department of ethnology was installed in a case and placed in the rotunda of the Museum. The skeleton of Zeuglodon was hung from the ceiling of the southeast court. In the departments of minerals and comparative anatomy workmen were engaged in putting down concrete bases upon which to erect wall cases.

March.—In addition to the large amount of work required of the laborers in connection with the arrangement and installation of the material returned from the Atlanta Exposition, much other work was performed. The old Mexican cart was suspended from the ceiling of the east hall, and the platform on which it formerly rested was removed. All the material from the Third-street annex was transferred to the new storage house on Ninth street. The model of the locomotive exhibited on the platform over one of the windows in the east hall was taken down, and the platform removed. The Siamese cart was suspended from the ceiling, opposite the Mexican cart. All the material stored in the lecture hall was removed, and the hall cleaned and put in complete order for the regular course of Saturday afternoon lectures. Several of the pier screens in the mineral hall were lowered to conform with the others. Wires were placed under the floor of the lecture hall, from the desk to the stand used by the lantern operator.

April.—Material from the osteological and other work rooms was removed to the Ninth street annex. The plaster casts of the winged bull and lion were placed in position at the entrance to the east hall, and two large wooden idols were taken off their bases and placed on the balconies west of the rotunda. The three large railroad maps which were mounted on the south wall of the east hall were taken down and placed on the front of east balcony. All the cases were removed from

the rotunda. In anticipation of the meeting of the National Academy of Sciences, the lecture hall was cleaned. The work of taking down and remounting the cases in the east-south range, preparatory to laying an artificial stone floor, was commenced. The exhibition cases in the boat hall were removed to the fisheries hall to make room for the rearrangement of the boats on the walls and ceiling. The work of constructing new mahogany wall cases in the east hall was completed and the cases painted. The large arch screen at the east entrance to the Museum was altered.

May.—One of the large wall screens in the east hall was strengthened, with a view to mounting the Hittite casts thereon. A large Indian war canoe was suspended from the ceiling of the boat hall. Painters commenced work on the storage sheds at the armory. The models of the locomotives "Arabian" and "Tom Thumb" were mounted on floor cases in the east hall.

June.—The idols from Easter Island were moved from the vestibule and placed outside the north entrance to the Museum. The storm doors at the north entrance were removed, certain woodwork cut away, and the top step reset. The old floor inside the north entrance was taken up, and other preliminary matters attended to preparatory to commencing work on the proposed improvements in the vestibule. A section of gallery was put up in the hall of geology and a case placed thereon, to test the appearance and effect of the galleries under contemplation. The seats along the wall of north hall were cleaned and oiled.

In addition to the work of the mechanics, already mentioned, there were constructed in the shops of the Museum 38 moth-proof quarter-unit cases, 8 pine quarter-unit cases, 2 special unit cases, 2 oak and 3 pine book-cases, 3 pine catalogue-cases, 1 pine shelf-case, 5 pine storage-cases, 3 cases of drawers, 4 pine cases for lay figures, 1 pine case for holding papers, 3 cupboards, 2 closets, 192 unit drawers, 2 case drawers, 4 pier-screens, 2 floor-screens and 2 arch-screens, 4 step-ladders and 2 tables, besides many other articles.

The following is a partial list of cases, furniture, fittings, etc., repaired and altered: Six book-cases, 1 card catalogue-case, 1 key case, 9 pine bases, 5 oak bases, 12 unit boxes, 3 exhibition cases, 2 storage cases, 35 chairs, 4 case doors, 22 other doors, 462 unit drawers, 4 case drawers, 1,000 label-holders, 9 window sash, 20 floor, arch, and window screens, 60 shelves for cases, and 2 tables.

Other incidental work included the following items: Cases painted, 10; fire buckets lettered, 29; fire buckets lined with tin, 21; exhibition blocks made, 5,523; exhibition blocks painted, 5,469; exhibition blocks ebonized, 74; unit boxes painted, 14; unit boxes mounted on screens, 69; unit boxes fitted to cases, 140; door-screen cases, etc., painted, 18; doors painted, 9; unit drawers fitted to cases, 462; doors of cases, etc., glazed, 59; locks put on cases, etc., 80; case shelves painted, 107; storage-shelf racks put up, 15; sheds put up, 1; sheds painted, 3; transparencies lettered, 32; transparencies mounted, 31; ventilators put on windows, 12.

A large amount of work has been accomplished under the direction of the engineer. The covering of the steam pipes in the trenches has been removed and replaced with new material. The pipe dies used by the steam fitter have received attention, and are now in perfect

condition. The height of the exhaust pipe of the gas engine in the Museum carpenter shop was increased, in order to carry the exhaust above the windows in the main building. A number of electric lights were installed, as indicated above, and several changes were made in the location of steam radiators. The time and watch clocks received careful attention, and have given good results during the year. The furnaces were repaired, and new grate bars provided. Automatic oil feeders were placed upon the pumps. The boiler rooms and vaults of both buildings were painted and whitewashed.

PART II.

PAPERS DESCRIBING AND ILLUSTRATING COLLECTIONS IN THE U. S. NATIONAL MUSEUM.

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AN ACCOUNT OF THE UNITED STATES NATIONAL MUSEUM.

BY

FREDERICK W. TRUE,

Executive Curator, U. S. National Museum.

AN ACCOUNT OF THE UNITED STATES NATIONAL MUSEUM.[1]

By Frederick W. True.

Among the powers conferred on Congress by the Constitution is authority "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."[2] A result of this provision was the establishment of the Patent Office and the assembling in connection therewith of numerous models of inventions.

A building for the Patent Office was erected in 1812, but it was destroyed by fire in 1836, and with it the models and records it contained.

"In the Patent Office building and with it destroyed," writes Dr. Goode,[3] "there was gathered a collection of models which was sometimes by courtesy called the 'American Museum of Arts,' and which afforded a precedent for the larger collection of models and natural products, which remained under the custody of the Commissioner of Patents until 1858, when it was transferred to the Smithsonian Institution and became a part of the present National Museum."

Though an assemblage of objects of more or less scientific interest was thus early formed as an indirect result of the policy pursued by the Government, the establishment of a national museum was earlier in the minds of many American statesmen, especially in connection with the educational institutes which it was thought the Government should found for the intellectual advancement of the people.

In the plan for a Federal university published in the Pennsylvania Gazette in 1788, and commonly credited to Madison,[4] section 8 relates to natural history, and in connection therewith the remark is made:

> To render instruction in these branches of science easy, it will be necessary to establish a museum, and also a garden, in which not only all the shrubs, etc., but all the forest trees of the United States should be cultivated.

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[1] This article is reprinted from the recently published volume commemorating the close of the first fifty years of the existence of the Smithsonian Institution, entitled "The Smithsonian Institution, 1846-1896: The History of its First Half Century." Edited by George Brown Goode. City of Washington, 1897.—F. W. T.

[2] Article 1, section 8.

[3] Goode, G. Brown. "The Origin of the National Scientific and Educational Institutions of the United States," Annual Report of the American Historical Association for the year 1889, page 7.

[4] See Goode, *ibid.*, pp. 66, 126, who believed Benjamin Rush of Pennsylvania to have been the author of the plan.

The plan for a "National Institution" put forth by Joel Barlow in 1806 includes mention of the natural history and art museums of France in the preamble, and in the plan itself (though ambiguously worded) are provisions for collections of minerals and philosophical instruments.

While these and other similar plans show that the formation of national collections of art and science was thought desirable by the fathers, they did not result directly in the establishment of museums under the Government. The first really scientific collection that came into the possession of the Government was probably, as Dr. Goode has remarked,[1] Smithson's cabinet of minerals, which was delivered, with the remainder of the Smithson estate, into the hands of Richard Rush, the agent of the United States, in 1838. The collection is described by a committee of the National Institute as follows:

> Among the effects of the late Mr. Smithson is a cabinet which, so far as it has been examined, proves to consist of a choice and beautiful collection of minerals, comprising probably eight or ten thousand specimens. The specimens, though generally small, are extremely perfect, and constitute a very complete geological and mineralogical series, embracing the finest varieties of crystallization, rendered more valuable by accompanying figures and descriptions by Mr. Smithson, and in his own writing. The cabinet also contains a valuable suite of meteoric stones, which appear to be suites of most of the important meteorites which have fallen in Europe during several centuries.

Three years later, in 1841, there was formed in Washington, chiefly through the exertions of Hon. Joel R. Poinsett, of South Carolina, a scientific organization under the name of the National Institute with the avowed purpose of assembling scientific collections. Article 14 of the bill of incorporation reads thus:

> The resident and corresponding members shall exert themselves to procure specimens of natural history, and so forth; and the said specimens shall be placed in the cabinet, under the superintendence of a board of curators, to be appointed by the directors. All such specimens, and so forth, unless deposited specially, shall remain in the cabinet; and, in case of the dissolution of the institution, shall become the property of the United States.[2]

The Institute was dissolved in 1861 and its collections deposited in the Smithsonian Institution. "By this society," remarks Dr. Goode, "the nucleus for a national museum was gathered in the Patent Office Building in Washington, and public opinion was educated to consider the establishment of such an institution worthy of the attention of the Government of the United States."[3]

The first collections of any magnitude which the National Institute

[1] Goode. "Genesis of the National Museum," Report United States National Museum, 1891, p. 273.

[2] Rhees, W. J. "The Smithsonian Institution: Documents Relative to its Origin," p. 240.

[3] Report of the United States National Museum, 1893. page 3. For a full account of the National Institute and its relation to the Smithsonian Institution, by Dr. Goode, the reader is directed to "The Smithsonian Institution, 1846–1896, the History of its First Half Century," 1897, pp. 38–48.

took under its care were those of the United States Exploring Expedition which was sent out by the Navy Department, under Lieutenant Wilkes, in 1838. Earlier expeditions under the auspices of the Government had been organized, but they either made no collections or deposited such as they did make in private museums outside of Washington.

The first collections of the exploring expedition were received in Philadelphia in 1840 and were temporarily stored in a room belonging to the Philadelphia Museum. Poinsett induced the Secretary of the Navy, James K. Paulding, to forward these collections to Washington, and interested himself to secure from Congress an appropriation of $5,000 to defray the cost of their transportation and subsequent arrangement.

In April, 1841, the collections were deposited in a portion of a room in the new Patent Office, designated for the purpose by the Secretary of State. Dr. Henry King, a geologist and mining expert and curator of the National Institute, was in direct charge. The compensation of the curator was paid from the appropriation of Congress already referred to.

With what rapidity collections accumulated under the charge of the National Institute may be learned from the report of the committee of the Institute dated January 1, 1842. This report recites that "the entire collection is deposited in the upper rooms of the Patent Office; it consists of:[1]

Donations from foreign governments.

Donations from other institutions, foreign and domestic.

Donations from ministers and consuls abroad, and fr m officers of our Army and Navy.

Donations from individuals and from members of the Institution. The Iowa collection of mineralogical and geological specimens, made by R. D. Owen, esq., under the direction of the Treasury Department.

The collection of mineralogical and geological specimens which had been on deposit in the bureau of the Corps of Topographical Engineers.

The collection of portraits of distinguished Indians, and the collection of Indian curiosities which had been on deposit in the War Department.

The minerals, books, papers, and personal effects of the Smithsonian bequest.

The two shipments which have been received from the exploring squadron, consisting of minerals, specimens of natural history, works of art, implements of war, and curiosities.

The books, minerals, and works of art belonging to the late Columbian Institute.

The books, papers, and proceedings of the late American Historical Society.

Cabinets and specimens, deposited by members in trust, for public use.

These collections, according to the same report, comprised about 1,000 books and pamphlets, 50 maps and charts, 500 castings in plaster, medals and seals, 186 paintings, about 1,600 birds' skins, 160 skins of quadrupeds, 50 skins of fishes; 200 jars, 2 barrels, and 10 kegs of fishes, reptiles, etc., in spirits; 50,000 botanical specimens, 3,000 insects,

[1] Goode. "Genesis of the United States National Museum," page 347.

several hundred thousand shells, 500 corallines, more than 2,000 crustaceans, 300 starfishes, etc., 100 sponges, 7,000 separate specimens of minerals, and 50 boxes of the minerals and geological specimens. Those engaged in caring for the collections at this time were the curator of the Institute, Dr. King, a taxidermist, a botanical assistant and two other assistants, a mechanic, and a laborer.

Thus was established what in reality was a national museum, containing collections belonging to the Government, sustained by an appropriation from Congress, and employing a curator and assistants. For a time prosperity seemed assured, but complications soon arose which proved disastrous in the highest degree not only to the Museum but to the National Institute itself.

The room in the Patent Office set apart for the collections by direction of the Secretary of State was needed for the display of models of inventions, and the Commissioner of Patents made strong protests against its occupancy by the Institute.

In August, 1842, Congress authorized the occupancy, "until other provisions be made by law," and also appropriated $20,000 for the care and arrangement of the collections, but in addition ordered that the persons having the work in charge should be appointed by the Joint Committee on the Library.

Only a month earlier a charter had been granted to the Institute, in which all trusts previously held were confirmed. "The supporters of the Institute," writes Dr. Goode,[1] "were disposed to urge that this was applicable to the collections of the 'exploring squadron' at that time in the custody of the Institute. The question did not come up in a troublesome way at this time, for the Library Committee, at that time [not] unfriendly, simply confirmed the choice of curator made by the National Institute, and appointed Dr. Pickering to the position, Dr. Pickering being thenceforth subject to the Congressional committee, and only by courtesy acting for the National Institute."

A little later, in 1843, the Library Committee, having no longer any consideration for the Institute, without consulting its officers, appointed the Commissioner of Patents to have general charge of the Government collections, and Captain Wilkes, the head of the exploring expedition, to arrange and display them. Captain Wilkes proceeded with the work, pushing aside the collections of the Institute to make place for those of the Government, yet professing an interest in the welfare of the Institute and the security of its property. The drift of matters came to the attention of the officers of the Institute only by rumor, but Col. J. J. Abert initiated a correspondence with Captain Wilkes, inquiring whether he or his assistants would devote any time to the care of the collections of the Institute, and stating that if such was not the case the attention of the Institute would be immediately called to the necessity of otherwise protecting its property. The replies were not satisfactory. Captain Wilkes held that as he and his

[1] Goode. "Genesis of the United States National Museum," page 311.

assistants were paid by the Government they could not spend any time in working upon collections belonging to a private organization. Nevertheless, he expressed an intention not to disturb the collections of the Institute more than should be really necessary in working out those of the Government, and to watch over them as far as possible.

A few months later, in a correspondence relative to the "Ontonagon" copper bowlder now in the National Museum, the Commissioner of Patents took the same ground, and held also that he had entire control over the room in which the property of the Institute was deposited.

At the end of 1843, therefore, the National Institute found itself bereft of the control of the Government collections, without funds, except the membership dues, which were much in arrears, and without quarters for its large and rapidly accumulating collections.

"The real cause of the decline of the National Institute," writes Dr. Goode,[1] "was simple enough. Failing to secure grants of money from Congress, the society was overwhelmed by the deluge of museum materials, which in response to its enthusiastic and widely circulated appeals came to it from all quarters of the world. The annual receipts from the assessment of members were insufficient to pay for the care of the collections, and although by virtue of the long term of its charter the collections were kept together until 1861, there was little science and little energy manifested in this administration."

While the events we have mentioned were taking place extended discussions were going on in Congress, and in the country generally, regarding the proper disposition to be made of the bequest of James Smithson. It is unnecessary in the present connection to consider the various views put forth, further than to remark that several schemes included provisions for museums of natural history and the arts.

The act of incorporation of the Smithsonian Institution, passed August 10, 1846, provided that the Regents, having selected a proper site, "shall cause to be erected a suitable building, of plain and durable materials and structure, without unnecessary ornament, and of sufficient size, and with suitable rooms or halls for the reception and arrangement, upon a liberal scale, of objects of natural history, including a geological and mineralogical cabinet; also, a chemical laboratory, a library, a gallery of art, and the necessary lecture rooms."

It is further provided that the Regents "may so locate said building, if they shall deem it proper, as in appearance to form a wing to the Patent Office building, and may so connect the same with the present hall of said Patent Office building, containing the National Cabinet of Curiosities,[2] as to constitute the said hall, in whole or in part, the deposit for the cabinet of the said Institution, if they deem it expedient to do so." This plan was not adopted.

Section 6 of the same act provides that "in proportion as suitable

[1] Goode. "Genesis of the United States National Museum," page 328.

[2] See Goode, op. cit., page 301.

arrangements can be made for their reception, all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging, or hereafter to belong, to the United States, which may be in the city of Washington, in whosesoever custody the same may be, shall be delivered to such persons as may be authorized by the Board of Regents to receive them, and shall be arranged, in such order and so classed as best to facilitate the examination and study of them, in the building so as aforesaid to be erected for the Institution."

Considering the section relating to buildings mandatory, and under the belief that the collections belonging to the Government must be accepted and housed, the Board of Regents of the newly established Institution proceeded at once with the erection of a large brown stone structure.

For various reasons the building was many years in construction, and during this period the first secretary, Joseph Henry, became more and more pronounced in his opinion that the Government collections should not be cared for at the expense of the Smithsonian fund. Indeed, he was in doubt whether the Institution ought to form extensive miscellaneous collections to be maintained permanently at the expense of its funds, although he fully appreciated the value of collections, and, as will presently appear, labored to carry out the programme adopted for the Institution by acquiring and caring for such special collections as could be made the direct means of increasing and diffusing knowledge. In the report for 1850 he remarked:

> It would not be in accordance with the spirit of the organization to expend the income in the reproduction of collections of objects which are to be found in every museum of the country. Natural history can be much more effectively promoted by special collections of new objects, by appropriations for original explorations and researches, and, above all, by assistance in the preparation of the necessary drawings, and by presenting to the world, in a proper form, the labors of naturalists. In conformity with these views it has been resolved to confine the collections principally to objects of a special character, or to such as may lead to the discovery of new truths, or which may serve to verify or disprove existing or proposed scientific generalizations.[1]

Again, in the report for 1851, perhaps thinking that his position regarding museums might be misunderstood, he wrote:

> I would distinctly disavow the intention of underrating the importance of collections in themselves. On the contrary, it ought to be the duty of the Smithsonian Institution to point out the means by which they may be made, and to aid in the work to the extent of its ability by embracing all opportunities which may offer for procuring specimens for distribution and by facilitating exchange and assisting explorations.[2]

In the same connection he expressed his views regarding the importance of a National Museum in the following words:

> Though the formation of a general collection is neither within the means nor the province of the Institution, it is an object which ought to engage the attention of

[1] Smithsonian Report, 1850, page 21 (reprinted in report for 1853, page 202).

[2] *Ibid.*, 1851, page 24 (reprinted in report for 1853, page 227).

Congress. A general museum appears to be a necessary establishment at the seat of Government of every civilized nation. * * * An establishment of this kind can only be supported by Government; and the proposition ought never to be encouraged of putting this duty on the limited though liberal bequest of a foreigner. The Smithsonian Institution will readily take the supervision of an establishment of this kind, and give plans for its organization and arrangement, provided it be requested to do so and the means for effecting the object be liberally supplied.[1]

In 1850 Prof. Spencer F. Baird was appointed assistant secretary of the Institution, in charge of publications and museum. He brought with him from Carlisle, Pa., not only a considerable zoological collection assembled by his own activity, but, what was vastly more important, a system of recording, assorting, and distributing collections which was sufficiently comprehensive and elastic to meet the needs of a great museum. In December, 1850, he placed in the hands of Secretary Henry a full outline of operations, which he afterwards carried into practice with the most signal success. He perceived that the numerous surveying parties which the Government was sending out from year to year into the Western Territories would be powerful agencies in increasing the knowledge of the natural history of the country if they could be induced to make collections of natural objects along the various routes they traversed. To this end the influence of the Institution was brought to bear on those officials of the Government who had the several surveys in charge.

The extent and form of participation by the Institution in the explorations of the Government surveys varied in different cases. In some instances the Secretary of War was induced to grant an officer of the Army leave of absence for the purpose of making scientific explorations in some little-known part of the country. Again, the Institution furnished outfits and directions for collecting to such surgeons and other officers of the surveying and exploring parties as manifested an interest in natural-history explorations. In some cases the personnel of an exploring party included a naturalist of known abilities and experience, and the Institution furnished every facility for collecting.

On this point Professor Baird, referring to the Mexican Boundary and Pacific Railroad surveys, reported in 1853 as follows:

Without a single exception, all these parties have been fitted out at the Smithsonian Institution with all necessary instruments and apparatus for natural-history research, much of it contrived with special reference to the exigencies of the particular service involved. Full instructions were also supplied, by which persons without previous practice were enabled to master all the general principles required for making observations and collections of every kind.[2]

The participation of the Institution also took the form of aid in the publication of results. Every year one or more publications based on the collections of the Government parties were published.

Fostered by the Institution to whose interest Professor Baird lent enthusiasm and untiring energy, the work of collecting yielded abun-

[1] Smithsonian Report, 1851, page 25 (reprinted in report for 1853, page 227).

[2] *Ibid.*, 1853, page 52.

dant fruits. In 1853, three years after his arrival at the Institution, Professor Baird, having worked along the lines laid down by Henry in procuring such series of specimens as were calculated to open up new fields of study and to increase knowledge, was able to report on the wonderful development of the natural-history collections in the following words:

It may be well to call attention to the fact that it has been the work of but three years to raise this collection from nothing to the front rank among American cabinets, exceeding all, perhaps, in the number of new species first brought to light within its limits. Nor has effort been confined merely to the acquisition of specimens, but to their concentration in mass, so as to supply all working naturalists with the materials of research. As already stated, applications for such assistance are constantly being received, and always met with all possible promptness; so that scarcely any natural history monograph or memoir of any extent has been published in this country within a year or two which has not been indebted in this way to the Institution. From the care, too, taken to keep separate all the localities, however near together, of any species, the collection affords information in reference to the geographical distribution of species of the very highest value.[1]

At the end of a decade, in 1860, Professor Henry was able to say:

The scientific material thus collected is very valuable, and, in number and variety of specimens and duplicates to illustrate the natural productions of the North American Continent, far excels any other collection ever made.[2]

While the Institution was thus exerting itself to obtain special collections to serve as the basis of research, the Commissioner of Patents was growing each year more desirous of having the use of the space occupied in the Patent Office by the national collections, and appealed frequently to Congress and to the Regents of the Institution to relieve him of their care.

In 1857, when Professor Henry brought the matter before them anew, they finally agreed that the transfer of the collections to the Smithsonian building should take place, but stipulated that an appropriation should be made to cover the expense of the transfer and the construction of cases in the Smithsonian building, and that the Secretary of the Interior should undertake to obtain from Congress, as before, an annual appropriation for the care of the collections. In his report for 1856, Secretary Henry said:

For the present, it may be well to adopt the plan suggested in a late report of the Commissioner of Patents, namely, to remove the museum of the Exploring Expedition, which now fills a large and valuable room in the Patent Office, wanted for the exhibition of models, to the spacious hall of the Institution, at present unoccupied, and to continue, under the direction of the Regents, the appropriation now annually made for the preservation and display of the collections.

Although the Regents, a few years ago, declined to accept this museum as a gift, yet, since experience has shown that the building will ultimately be filled with objects of natural history belonging to the General Government, which, for the good of science, it will be necessary to preserve, it may be a question whether, in consideration of this fact, it would not be well to offer the use of the large room immedi-

[1] Smithsonian Report, 1853, page 54. [2] *Ibid.*, 1860, page 44.

ately for a national museum, of which the Smithsonian Institution would be the mere curator, and the expense of maintaining which should be paid by the General Government.[1]

"I can find no record in the minutes of the Regents," writes Dr. Goode, "but have been informed by Mr. W. J. Rhees, of the Smithsonian Institution, that an urgent request for the use of the hall was made by the Commissioner of Patents and the Secretary of the Interior, and that the board decided to grant this request on the condition that Congress should appropriate money for the construction of the cases and the transfer of the collections, and that the Secretary of the Interior should provide for the expenses of the care of the collections after their transfer in the same manner as before."[2]

The collections were transferred to the Institution in 1858. Professor Baird reported that year[3] that twelve separate collections were received from the Patent Office, of which the most considerable was the collection of the exploring expedition under Captain Wilkes. He estimated that the Patent Office collections together constituted about one-fifth of the objects in the Smithsonian museum. He pointed out also that there were then in the museum twenty-three other Government collections which had never been in the Patent Office. These were chiefly assembled by the different field parties of the Pacific Railroad Survey, the Mexican Boundary Survey, and other Government expeditions engaged in exploring the national domain.

The policy relating to the treatment of the collections adopted by the Institution was fully explained in the report of the Secretary for 1861, though in most of its essential features it was in operation as early as 1857. Secretary Henry remarks:[4]

The specimens may be divided into two classes—first, those which have been described in the reports of Government expeditions or the transactions of the Smithsonian and other institutions; and, second, those which have not been described, and which consequently are considered of much value by the naturalists who are interested in extending the several branches of natural history. Of both classes the Institution possesses a large number of duplicates, in the disposition of which some general principles should be kept constantly in view. After due consultation with naturalists, the following rules, which were presented in the last report, have been adopted relative to the described specimens:

First. To advance original science, the duplicate type specimens are to be distributed as widely as possible to scientific institutions in this country and abroad, in order that they may be used in identifying the species and genera which have been described.

Second. To promote education, as full sets as possible of general duplicates, properly labeled, are to be presented to colleges and other institutions of learning that profess to teach the principal branches of natural history.

Third. It must be distinctly understood that due credit is to be given to the Institution in the labeling of the specimens, and in all accounts which may be published

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[1] Smithsonian Report, 1856, page 22.

[2] Goode. "Genesis of the United States National Museum," page 342.

[3] Smithsonian Report, 1858, page 52.

[4] *Ibid.*, 1861, page 41.

of them, since such credit is not only due to the name of Smithson, but also to the directors of the establishment, as vouchers to the world that they are faithfully carrying out the intention of the bequest.

Fourth. It may be proper, in the distribution to institutions abroad, as a general rule, to require, in case type specimens to illustrate species which have been described by foreign authors may be wanted for comparison or other uses in this country, that they be furnished at any time they may be required.

Fifth. In return for specimens which may be presented to colleges and other educational establishments, collections from localities in their vicinity, which may be desirable, shall be furnished when required.

In the disposition of the undescribed specimens of the collection, it is impossible to be governed by rules quite as definite as those which relate to the previous class, but the following considerations have been adopted as governing principles:

1. The original specimens ought not to be intrusted to inexperienced persons, or to those who have not given evidence of their ability properly to accomplish the task they have undertaken.

2. Preference should be given to those who are engaged in the laborious and difficult task of preparing complete monographs.

3. As it would be illiberal to restrict the use of the specimens and confine the study of them to persons who can visit Washington, the investigator should be allowed to take them to his place of residence and to retain them for a reasonable time.

4. The investigator must give assurance that he will prepare a set of type specimens for the Smithsonian museum, and will return all the duplicates, if required.

5. In any publication which may be made of the results of the investigation, full credit must be accorded to the Institution for the facilities which have been afforded.

All these provisions on the part of the Institution were carried out as far as the circumstances would permit. The money available was insufficient for employing paid assistants to any considerable extent, and the Institution had the benefit of the voluntary assistance both of many recognized authorities in the several branches of science and of young students. The extent and importance of this aid can not be overestimated. Collections which would have remained useless for years were rapidly classified by competent naturalists and separated into series, some to be reserved by the Institution and others to be distributed to kindred scientific establishments and to colleges and schools.

The list of collaborators includes almost every name prominent in American natural history in the last half century. Nor is this a matter for wonderment. The collections made by the exploring parties of the Government in the twenty-five or thirty years following the founding of the Institution contained a great number of highly interesting forms of animals and plants previously unknown to science, and the naturalists in whose hands the various series were placed constantly enjoyed the delight of discovering these and making them known to the world. The boundaries of American natural history were widened in every direction. As regards vertebrates, Professor Baird remarked as early as 1856:

Messrs. Audubon and Bachman describe about 150 North American species of mammals. This Institution possesses about 130 of these; and about 50 additional

species have already been detected, although the examination of the entire collection has not yet been completed.

Of North American birds, the Institution possesses nearly all described by Audubon and at least 150 additional species.

Of reptiles, the North American species in the museum of the Smithsonian Institution amount to between 350 and 400. Of the 150 species described in Holbrook's North American Herpetology, the latest authority on the subject, it possesses every genuine species, with one or two exceptions, and at least 200 additional ones. It has about 130 species of North American serpents for the 49 described by Holbrook.

Of the number of species of North American fishes it is impossible to form even an approximate estimate, the increase having been so great. It will not, however, be too much to say that the Institution has between 400 and 500 species either entirely new or else described first from its shelves.[1]

The scientific elaboration of the collections resulted in the publication of a great number of monographs and preliminary papers in the Smithsonian Contributions to Knowledge and Miscellaneous Collections, in the reports of the Government surveys, and in the journals of learned societies at home and abroad. Many of the more comprehensive of these works remained as standards for a quarter of a century, and some have not been supplanted at the present day.

In this work no one labored with more enthusiasm or more success than Professor Baird, who, while carrying the burden of caring for the collections and planning for the exploration of new fields, prepared and published a series of works on North American vertebrates which commanded the admiration of naturalists throughout the world.

Side by side with the activities resulting in the increase of knowledge, the work of diffusing knowledge by the distribution of named natural history specimens was carried forward on an extensive scale. In the first twenty years of its history the Institution, according to the estimate of Professor Baird,[2] distributed more than one hundred thousand specimens, of which the larger part were identified and labeled.

In 1861 the charter of the National Institute expired and the various objects belonging to that organization became the property of the Government and were transferred to the care of the Smithsonian Institution.

At this date, therefore, all the scientific and art collections belonging to the Government and the collections made by the Institution itself were assembled in the Smithsonian building. They comprised many thousands of objects, and were administered by Professor Baird as Assistant Secretary of the Institution.

From the time the Government came into possession, in 1841, of the collection made by the Wilkes Exploring Expedition Congress appropriated each year a small sum for the preservation of the objects accumulated in the Patent Office, which money was disbursed at first by the National Institute, afterward by the Commissioner of Patents or the Joint Library Committee of Congress.

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[1] Smithsonian Report, 1856, page 60. [2] *Ibid.*, 1865, page 85.

After these collections were transferred to the Smithsonian Institution, in 1858, the appropriations for maintenance continued year by year, though small in amount. In 1858 the appropriation was $3,650; in 1859, and for eight years following, $4,000. The Institution never received any compensation for the occupancy of its building. As early as 1856[1] Professor Henry expressed the opinion at an early day that the Government might with propriety and advantage purchase the Smithsonian building from the Institution for housing the Government collections "of natural history and the fine arts," but no action in that direction was ever taken.

When these collections were transferred from the Patent Office a series of new cases, designed by Thomas U. Walter, were erected in the main hall of the Smithsonian building for their display. Great progress has been made in museum methods in the last two decades, but the cases, arrangement, labeling, and taxidermy in the Smithsonian museum thirty-five years ago were probably as good as could be found in any scientific museum in the world at that time. The exhibition of many examples of a single species of animal or mineral, or of a single kind of ethnological or geological object, was not considered objectionable, and it was a common practice to mount and exhibit type specimens of animals. To such matters as the size of glass in cases, the color of woodwork and labels, the effect of different groupings of specimens, little attention was devoted. Indeed, the amount of money spent upon scientific museums was not sufficient for great refinement in display. Collections were exhibited for the satisfaction of the mature man of science, rather than the youthful student and the layman. Yet these latter classes were neither purposely neglected nor did they complain of the methods in vogue.

It is with interest that we read the following comment by Professor Henry on the Smithsonian museum in 1861:

> During the past year Washington has been visited by a greater number of strangers than ever before since the commencement of its history. The museum has consequently been continually thronged with visitors, and has been a never-failing source of pleasure and instruction to the soldiers of the Army of the United States quartered in this city or its vicinity. Encouragement has been given them to visit it as often as their duties would permit them to devote the time for the purpose.[2]

In 1865 an event of much importance occurred. A fire broke out in the second floor of the Smithsonian building and destroyed the upper portions of the edifice. Many collections were entirely destroyed or injured beyond repair, among which the most important were Smithson's personal effects and cabinet of minerals, a large series of portraits of Indians painted and owned by J. M. Stanley, and the collection of physical instruments, including Hare's experimental apparatus and "the lens used by Priestley for the evolution of oxygen from the oxide

[1] Smithsonian Report, 1856, page 22. [2] *Ibid.*, 1861, page 44.

of mercury, and by means of which the first distinct recognition of this elementary substance was effected."[1]

This event produced results affecting the Museum in many ways. It called attention to the fact that the library of the Institution was kept in rooms not fireproof, and the transfer of the books to the Library of Congress was hastened, the space being subsequently occupied by the less valuable portions of the natural history collections. By the destruction of the Stanley portraits of Indians, which, though really an ethnological collection and only on deposit in the Institution, formed an important part of what (with frequent apologies) was called "the gallery of art," the attempts to form an art collection of merit received discouragement. The reconstruction of the building, made necessary by the fire, led to a new assignment of rooms for the ethnological collections. Previous to the fire the upper story had been used principally as a lecture room, but the interest in lectures flagging for a time it was determined after the reconstruction to place the ethnological collections in that portion of the building, but the transfer was not effected until several years later.

Though the formation of an art gallery was provided for in the organization of the Institution and a few art objects came into the possession of the Government from time to time, Professor Henry took the position at an early day that with the funds available the establishment of an art collection worthy of the name was impossible. When Mr. W. W. Corcoran first took active steps toward the formation of the Corcoran Art Gallery, in 1869, Henry recommended that art objects belonging to the Institution should be deposited therein. In 1873 the Board of Regents approved the plan, and in the following year a few paintings, sculptures, and engravings were transferred.

In the early days of the Institution the valuable collection of engravings made by Hon. George P. Marsh was purchased (the only large purchase by the Institution in the direction of art), and soon after the fire in the Smithsonian building it was transferred to the Library of Congress.

By 1874, therefore, the Institution had definitely abandoned all efforts toward the establishment of an art gallery, and though some few objects connected with the fine arts have come under its care in later years, they have never been assembled so as to form a proper "gallery."

In 1871 Congress established the United States Fish Commission and Professor Baird was placed at its head. The organization of the Commission on this basis had a most important effect upon the development of the National Museum in certain directions. The work of the Commission had to do largely with the natural history of fish and other aquatic animals, and in the course of a few years very large collections

[1] Smithsonian Report, 1865, page 18.

of marine life were deposited in the Museum. Later the work of the Commission turned toward the investigation of the phenomena of the deep sea, and in 1882 a seagoing steamer, the *Albatross*, was built, and extensive sounding and dredging operations in great depths were carried on.

The collections made during the progress of this work, and deposited in the Museum, were of the highest scientific interest, and the results already published by Goode, Verrill, Bean, Rathbun, Smith, and other naturalists have attracted worldwide attention. In many other ways, which can not be detailed in the present connection, the work of the Commission was of direct and indirect benefit to the Museum, and the cooperation of these two governmental organizations has continued until the present.

Not many years after the organization of the Commission the question of the desirability of holding a great world's fair to commemorate the hundredth anniversary of the Declaration of Independence began to be agitated in the country. The movement culminated in the organization of the Centennial Exhibition of 1876, held in Philadelphia. This event was destined to have a more important effect upon the National Museum than any which had occurred since the founding of the Smithsonian Institution.

The Government determined that the various departments and bureaus should make extensive exhibits indicating their several functions, and on January 23, 1874, the President appointed a Government board to have general charge. The Smithsonian Institution was represented by Professor Baird. In the first plans of the board the National Museum exhibit was included under that of the Institution, and the Fish Commission apparently under the Interior Department. They included also an item of $200,000 for an exhibition building which should be "capable of removal to Washington after the close of the Exhibition, to be used as a National Museum at the capital of the nation."[1] Congress, however, saw fit to modify these plans and provided for the erection of a general Government building, to be paid for pro rata from the appropriations of the several departments and bureaus, and to be sold at the close of the Exhibition. An appropriation of $67,000 was made for the Smithsonian Institution, and of $5,000 for the Fish Commission, the provision for the National Museum being included in the former. When the several officers of the board began to examine the situation in detail it became apparent that different bureaus would duplicate one another's exhibits unless some compromise were made. Accordingly the exhibits of the Institution, the National Museum, and the Fish Commission were merged into one comprehensive exhibit; while, on the other hand, the National Museum cooperated with the Indian Bureau of the Interior Department in an

[1] Smithsonian Report, 1875, page 59.

exhibit representing North American anthropology. The combined exhibit was divided into five sections—Smithsonian Activities, Animal Resources, Fisheries, Mineral Resources, Anthropology.

In the preparation of the exhibits of animal resources and fisheries, Professor Baird, then curator of the National Museum, had the assistance of G. Brown Goode, who held the position of assistant curator of the National Museum, Tarleton H. Bean, and H. C. Chester; in ethnology, Charles Rau, Edward Foreman, and F. H. Cushing; in mineral resources, William P. Blake and Thomas Donaldson.

When the idea of holding a great exhibition under the Government was first put forth, both Secretary Henry and Professor Baird foresaw that the effect on the National Museum must be of the greatest moment. The objects purchased and exhibited by the Government of the United States would find their final resting place in the Museum, and many foreign governments and private exhibitors would doubtless present their exhibits to the United States, with the result that they also would find their way into the Museum.

The results of the operations of the Institution in connection with the Centennial Exhibition [wrote Professor Henry in 1875] will probably have a much greater effect on the future of the establishment than is at first sight apparent. The large number of specimens which have been collected by the several departments of Government and by the Institution itself in view of this exhibition will greatly increase the contents of the National Museum, and if we add to these the specimens which will be presented by foreign powers, of which we have already had intimations, the number will be swelled to an extent far beyond the capacity of the present building to contain them, and an additional edifice will be required for their accommodation.

In the consideration of this matter the questions will arise whether the building required shall consist of an extension of the present Smithsonian edifice or an entirely separate building, and these questions will involve another, viz, whether it is advisable to continue, at least without some modification, the connection which now exists between the Smithsonian Institution and the National Museum.

The Museum is destined to an extension far beyond its present magnitude. It is an object of much interest to all who visit the national capital, and is of great value as exhibiting the natural resources of the country, as well as a means of public education.

Professor Baird, as exhibition representative of the Institution, wrote in the report of the same year as follows:

It will, however, be readily understood that the Smithsonian building will be entirely inadequate to accommodate this collection on its return from Philadelphia, especially as even now it is overcrowded and packed from top to bottom with thousands of boxes, for the proper exhibition of the contents of which there is no space or opportunity at the present time. It is to be hoped that action at an early day will be taken by Congress looking toward a proper provision for this emergency, especially when it is realized that the materials are thus available for a national museum that shall be equal in its extent and completeness and in its educational advantages to that of any nation in the world.

The collections made directly through the Government appropriations will also be very largely supplemented by the donation of series of American and foreign exhibitors, a very large proportion of which will be placed at the disposal of the United States Government.

The anticipations of Henry and Baird were fully met. In the report for the centennial year Professor Baird wrote:

At no period in the history of the National Museum, from the time when it was organized to the present, has the increase been so great as during the year 1876.[1]

After referring to the accessions from the Government exhibits, he remarks:

In addition, however, to the sources of increase to the Museum during the years 1875 and 1876, mentioned above, still another presented itself of perhaps even greater productiveness, viz, acquisitions from foreign exhibits. With scarcely an exception, the best and most important of these were presented to the United States at the close of the exhibition, embracing as they did many complete series of objects illustrating the geology, metallurgy, the ethnology, and the general resources of all nations. Of about forty governments and colonies, the choicest of the exhibits of thirty-four were presented to the Smithsonian Institution for the National Museum, the remainder either having nothing to give or being restricted in the disposal of their articles.

It was, however, not from foreign commissions alone that collections were received by the Institution. Several entire State exhibits and many belonging to private parties were also added to the general increase. Nevada, Montana, and Utah presented the whole of their mineral exhibits, while partial collections were received from several other States and Territories.

The Regents of the Institution submitted a memorial to Congress the same year (1876) asking an appropriation of $250,000 for a building for the National Museum. A bill was introduced, but failed of passage that year, and it was not until 1879 that the amount asked for was provided.

As soon as the law was enacted a building commission appointed by the Regents of the Institution was organized, consisting of the resident members of the executive committee of the Institution (Hon. Peter Parker and Gen. W. T. Sherman) and Secretary Baird. General Sherman was chosen as chairman and Gen. M. C. Meigs was invited to act as consulting engineer.

The commission selected the firm of Cluss & Schulze, whose design for the building had been approved by Congress, as superintending architects, and received the benefit of the advice of Mr. Edward Clarke, Architect of the Capitol.

The erection of the building was begun April 17, 1879, and completed in 1881. In design the structure is of the type commonly employed for exhibition buildings, being entirely open above the ground floor. It covers a space of $2\frac{1}{3}$ acres. On account of the relatively small amount appropriated for the building and the enormous growth of the national collections, it was necessary to use building materials of low cost and to cover in as much space as possible. The building is regarded as one of the cheapest of its size ever erected. While admirably adapted in most respects for the purpose for which it was built, it does not, of course, present, either externally or internally, an appearance as pleas-

[1] Smithsonian Report, 1876, page 38.

ing or dignified as would have resulted from the use of a more expensive system of construction and more costly materials.

While the building was under construction, Congress decided that the United States Government should be represented at the Berlin Fisheries Exhibition of 1880 by the Fish Commission. Professor Baird, then both Secretary of the Institution and Fish Commissioner, appointed G. Brown Goode, the curator of the National Museum, as his deputy at the exhibition. By this fortunate combination of circumstances, Dr. Goode, the working head of the National Museum, was afforded an opportunity to study the museums of Germany and other parts of Europe, and brought home with him a knowledge of the most approved methods of installation of collections, labeling, and storage, which was invaluable. Far more fortunate was it that the Museum at this critical time in its history had as its curator a man of such surpassing merit as the lamented editor of this volume.[1] Gifted with a philosophical mind, a profound love of nature, a marvelously retentive memory, and untiring energy, he acquired a range of knowledge and a grasp of affairs which astonished his associates, while his modesty, gentleness, and love of fair play attracted to him and bound to his service men of the most diverse capacities and opinions. His genius was known to Secretary Baird, but hitherto he had not found a sufficiently wide field for the exercise of his powers. The reorganization of the Museum afforded an opportunity, and Baird gave him free scope for the development of his plans, aiding him as no one else could have done, from the stores of a lifetime of experience along the same lines.

Out of the heterogeneous materials accumulated by the Government, especially as a result of the Centennial Exhibition, Dr. Goode organized, under the approving guidance of Secretary Baird, a public museum of wide scope, attractive, instructive, orderly, and full of the elements of life. He elaborated with the greatest pains a philosophical and comprehensive classification for the collections of the Museum, and planned a complete reorganization of the staff of curators and assistants. He devised an entirely new series of cases and other fixtures, for the installation of both the collections exhibited to the public and those reserved for the use of investigators, adopting the best features then developed in European museums, and adding many of his own invention.

This regeneration of the National Museum soon made itself felt in similar organizations throughout the United States and in other parts of the world, and the methods of installation and labeling employed in Washington have been widely copied.

The influence of the National Museum has not, however, stopped here. Already at the Berlin Fisheries Exhibition of 1880, with the experience gained during the Centennial Exhibition, Dr. Goode was

[1] The History of the Smithsonian Institution, from which this article is extracted, was edited by Dr. Goode.

able to secure for the United States Fish Commission and the National Museum the Emperor's prize for the highest excellence of display. Not satisfied with this recognition, and always aiming to advance, he endeavored to install the exhibits of the Institution and Museum at later foreign and domestic exhibitions, in accordance with the best museum methods. As a result the exhibits of the Institution always won high praise, and it is not too much to say that the work of the National Museum in this direction has had a powerful influence in revolutionizing exhibition methods in America.

Since the Centennial Exhibition of 1876 few years have passed in which the Museum has not been engaged in preparing for public exposition of greater or less magnitude. It made displays at London in 1883, at Louisville in 1884, at Minneapolis in 1887, Cincinnati and Marietta in 1888, at Madrid in 1892, at Chicago in 1893, and at Atlanta in 1895. As might naturally be expected, the necessity of carrying on exhibition work outside of Washington has affected the National Museum in many ways.

Probably no other great permanent museum in the world has had constantly before it the problem of guarding its treasures from deterioration and at the same time transporting no inconsiderable portion of them thousands of miles and displaying them under the ordinarily unfavorable surroundings of temporary exhibitions. The advantages lie in the direction of making the work of the Museum known to the people of the Republic and the world at large and securing new objects with which to fill out the deficiencies in its various collections. The disadvantages are found in damage done to objects in the collections, by breakage or otherwise, the interruption of the regular Museum work, and the dissipation of the energies of the scientific officers; for a museum, like any other permanent institution, requires abundant time and uninterrupted activity for its best development, and does not flourish in the midst of commotion and excitement.

Thus far I have considered the National Museum in its historical aspects. It remains to explain briefly its function and aims and to mention the most notable objects in its collections.

It will be perceived, from the statements already made, that the Museum is essentially a natural development springing from the activities of the Government, growing with their growth and expanding with their expansion. It had its origin in the great naval exploring expedition which the Government organized in the early part of the century, and found an important expansion in the long series of topographical surveys of the public domain and geological surveys of later years. The scientific investigation of the primary industries—agriculture, fisheries, and mining—by the Government have also resulted in large additions to the Museum. Finally, the desire on the part of the Government that the people should gain a better understanding of its practical workings, through representative displays of processes and objects in

the great public exhibitions, have broadened the activities and increased the wealth of the Museum, both directly and indirectly: directly, because the Museum has need to bestir itself to bring together and arrange exhibits which will be acceptable to the public; indirectly, because the participation of the Government of the United States often leads other governments to participate, and the exhibits of these, in greater or less proportion, are ultimately presented to the United States for its National Museum.

The field of activities of the Government has had a strong influence on the character of collections of its National Museum. While European governments have been engaged in exploring new regions and founding colonies in distant sections of the globe, that of the United States has confined its attention almost exclusively to North America. The collections of the National Museum, therefore, are predominantly North American. Leaving out of consideration the important foreign collections of a few early expeditions, and those resulting from the deep-sea investigations of the United States Fish Commission, the additions in this direction have chiefly come from the activities of private explorers, by gift of foreign governments at expositions, by exchange of specimens, and only in a few instances by purchase.

In the organic law of the Smithsonian Institution it is provided that—

> in proportion as suitable arrangements can be made for their reception, all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging or hereafter to belong to the United States, which may be in the city of Washington, in whosesoever custody the same may be, shall be delivered to such persons as may be authorized by the Board of Regents to receive them, and shall be arranged in such order and so classed as best to facilitate the examination and study of them.

In the act of June 30, 1880, making appropriations for the sundry civil expenses of the Government, it is enacted that "all collections of rocks, minerals, soils, fossils, and objects of natural history, archæology, and ethnology, made by the Coast and Interior Survey, the Geological Survey, or by any other parties for the Government of the United States, when no longer needed for investigations in progress, shall be deposited in the National Museum."[1]

In the same year, as we have said, Congress appropriated money "for a fireproof building for the use of the National Museum."

As may be seen from the statutes cited, the National Museum is the recognized depository for all objects of scientific and artistic interest and value which come into the possession of the Government. Its function is to preserve these treasures perpetually, and to administer the collections in such a manner as to render them of the highest service to research and education. In pursuance of these ends it exhibits a portion of the collections for public inspection and instruction; another portion it assembles in laboratories for the use of investi

[1] Statutes United States, Forty-fifth Congress, third session, chapter 182, page 394.

gators. Out of the surplus accumulations it selects series of specimens for distribution to educational institutions, and it encourages publications which will make its treasures known to the world. Of these latter activities it will be necessary to speak somewhat more in detail before closing, and I will return to them presently. It is desirable to point out here the fact, which will become evident to any one upon reflection, that an institution such as the National Museum, with its facilities for investigation and its corps of trained specialists, soon becomes a center of intellectual activity, attracting to itself students and savants, and being called upon to impart technical information and advice. In these lines lies no inconsiderable part of its labor and usefulness.

It is to be said further that the Museum of to-day, owing in part to a natural development and in part to the labors of a few advanced leaders, among whom none have rendered more important service than the late Dr. Goode, is no longer content with a passive existence, but strives by the arrangement of its collections, by its labels, its handbooks and other publications, and its lectures, to impart instruction of a definite character and in definite lines. It assembles great collections of natural objects and treasures of art, not merely to satisfy idle curiosity but to diffuse knowledge among men. Thus it allies itself to the university and the library, and must be counted among the chief agencies for the spread of culture.

To describe in detail all the more important objects in the National Museum would require more space than can be devoted to such an enumeration in this place, but it will be of interest to point out the chief excellencies of the collections and to mention some of the treasures.

The collections are at present divided among the following departments and sections:

Zoological departments: Mammals, Birds (with a section of Birds' Eggs), Reptiles and Batrachians, Fishes, Mollusks, Insects, Marine Invertebrates (with a section of Parasitic Worms), Comparative Anatomy.

A Botanical Department.

Geological departments: Geology, Mineralogy, and Paleontology.

Anthropological departments: Prehistoric Anthropology, Ethnology (with a section of American Pueblo Collections), Oriental Antiquities.

A Department of "Arts and Industries," with the following sections at present: Historical Relics, Transportation and Engineering, Naval Architecture, Physical Apparatus, Electrical Collections, Technological Collections, Materia Medica, Forestry, and Graphic Arts.

The Department of Mammals comprises the collection of the Wilkes Exploring Expedition and of the numerous geographical and geological surveys of the public domain, including the type specimens of species described by Baird in his great work on North American Mammals, and numerous types of J. A. Allen, Elliott Coues, Harrison Allen, and

other American naturalists. The collections from the Mexican boundary recently made by Dr. E. A. Mearns, U. S. A., are large and of high scientific value.[1]

A series of casts of porpoises and other cetaceans, including a young humpback whale, forms a unique feature of the department.

The representation of foreign mammals, though deficient in many directions, includes a considerable number of type specimens and some important local collections, chief among which are those from German East Africa and from Kashmir and Eastern Turkestan, made and presented by Dr. William L. Abbott.

The collection of skulls of North American mammals is probably unrivaled elsewhere in extent, and the department also contains a large alcoholic series.

Of the Department of Birds the curator, Mr. Robert Ridgway, writes:

Among the most important collections and single objects contained in the Department of Birds are the following:

1. The collections made by the Wilkes Exploring Expedition, the various Pacific Railroad surveys, the Mexican Boundary Survey, the Geological Exploration of the Fortieth Parallel, the Geological Survey of the Territories, Geographical Surveys West of the One Hundredth Meridian, the United States Astronomical Expedition (Gilliss), and various other Government expeditions.[2]

2. The collection made by Col. A. J. Grayson in Western Mexico, including the Tres Marias and Revilla-Gigedo islands; collections made by Prof. F. Sumichrast on the Isthmus of Tehuantepec, and by Prof. C. Sartorius in the State of Vera Cruz, Mexico; collections made by F. A. Ober in the various islands of the Lesser Antilles.

3. The collections made by the United States Fish Commission during a cruise of the steamer *Albatross* around Cape Horn and in the Bahamas.

4. Specimens from Audubon's collection, among them a considerable number of types of his new species—that is, specimens from which the descriptions and colored plates in his great work were taken. These formed part of Professor Baird's private collection, and were given by Mr. Audubon to Professor Baird.

5. The private collection of Professor Baird, numbering nearly four thousand specimens, which formed the nucleus or beginning of the present national collection.

6. Other private collections donated to the National Museum.

7. The collections made by Dr. William L. Abbott in Eastern Africa, Madagascar, etc., generously presented to the National Museum and embracing a very large number of species entirely new to the Museum collection, many of them being new to science. These collections of Dr. Abbott, moreover, represent practically all that the Museum possesses from the countries named.

8. The collection of several thousand specimens from various parts of the world, presented by Mr. A. Boucard, of Spring Vale, Isle of Wight, England.

9. Extinct Birds: Great Auk (one specimen), Labrador Duck (several), Guadelupe Caracara (good series, old and young), and Philip Island Parrot, the latter purchased for the Museum by Dr. William L. Ralph, of Utica, N. Y.

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[1] The very extensive series of North American mammals made by the United States Department of Agriculture under Dr. C. Hart Merriam, the finest ever assembled, is deposited in the Museum building and catalogued in its registers.

[2] The valuable collections of birds made by the United States Department of Agriculture under direction of Dr. C. Hart Merriam in the United States and Mexico are deposited in the Museum building, as in the case of the mammals.

10. Very rare species, or those nearly extinct, as the Carolina Paroquet, Ivory-billed Woodpecker, Black-capped and Jamaican Petrels, Hawaiian Coot, Cuban Macaw, Peale's Sandpiper (several specimens, the only ones known to exist in collections), and numerous other species.

11. Unique types, such as Fisher's Petrel, Townsend's Bunting, Cooper's Sandpiper, Cooper's Hen-Hawk, Riker's Woodhewer.

The National Museum collection of North American birds is by far the most complete in existence, and is the basis of every important work on North American birds since Audubon's time. That of the birds of the West Indies is also the most important, although exceeded greatly in number by that of Mr. C. B. Cory, now the property of the Field Columbian Museum in Chicago, Ill. That of Central American and South American birds is exceeded in extent and value only by the British Museum's series of birds from the same region, and has been freely used by Messrs. Sclater, Salvin, Godman, Count von Berlepsch, and others in their various publications on neotropical birds, and is also largely the basis of Professor Baird's "Review of American Birds."

Museums throughout the world have been supplied with American birds by the United States National Museum, and the existing specimens of several species, such as the Roseate Gull, Greenland Redpoll, and several Alaskan species, have mainly—in some cases exclusively—been distributed by the National Museum.

It can safely be said that no collection of birds in the world compares with that of the United States National Museum in value or importance as a basis for scientific investigation already accomplished or yet to be done, since as many species as possible, with the facilities at command, are represented by large series of specimens from all parts of their geographical range and of all known variations dependent on climate, sex, age, or other circumstances.

The unparalleled collection of North American birds' eggs in the United States National Museum is the result of many years' growth. In the early years of the Institution Professor Bird interested the naturalists of the various Government surveys and members of the Hudson Bay Fur Company in the subject, and from them (and especially the latter) thousands of eggs were received. Mr. R. McFarlane[1] was particularly active, and with him were associated B. R. Ross, James Lockhart, John Reid, M. McLeod, A. McKenzie, and others, who sent not only eggs, but large collections of other kinds. The Institution sent Robert Kennicott to Arctic America in 1859, where he remained three years, collecting the natural productions of the region, and with them many eggs of Arctic birds.

Naturalists visiting Alaska and Labrador also made large contributions to the oölogical collections. The eggs of the rare northern water birds and waders so difficult to obtain for private collections were thus sent (often in large series) to the Institution.

In 1884 Major Bendire added to the already large collection his unrivaled series of eggs of western birds, obtained during twenty-five years of duty in the Territories. This collection numbered eight thousand or more beautifully prepared specimens. From that time till his death Major Bendire was untiring in his efforts to obtain the desiderata of the collection. More recently Dr. William L. Ralph, of Utica, N. Y., has presented his magnificent collection of eggs to the Institution, and is now actively engaged in filling gaps in the series.

To mention specifically all the rarities in the North American series of the oölogical department would be an almost endless task. A few of the more important ones are the following: Great Auk, one egg; Heermann's Gull, two eggs; Craveri's Murrelet, two eggs; Jabiru, one egg; Purple, Aleutian, Coues's, Baird's, Pectoral, White-rumped, and Curlew Sandpipers; Sanderling, two specimens (McFarlane); Heath Hen, one specimen; Passenger Pigeon, about thirty eggs; California Vulture, one

[1] See his report in Proceedings of the United States National Museum, Vol. XIV, pages 413–446.

egg; Harlan's, Krider's, and Short-tailed Hawks; Peale's, Richardson's, and Aplomado; Elf, Flammulated, and Californian Pigmy Owls; Carolina Paroquet; Ivory-billed Woodpecker; White-throated and Vaux's Swifts; Clarke's Nut-cracker, several eggs; Western Evening Grosbeak; American and Mexican Crossbills; Pribilof Snow-flake, several. Among the rare warblers may be mentioned: Brewster's, Virginia's, Lucy's, Cape May, Olive, Sennett's, Grace's, Townsend's, Hermit, Golden-checked, Gray, and Connecticut Warblers; Rio Grande and Belding's Yellow-throats; Red-faced Warblers.

Of foreign eggs may be mentioned Kamtschatkan Sea Eagle, Quesal, etc. Also various series of eggs, like those collected by Dr. Jerome H. Kidder on Kerguelen Island, Dr. William L. Abbott in Africa, Seychelles Islands, Asia, etc. On some of these reports have been made.[1]

Of the Department of Reptiles and Batrachians, the curator, Dr. Leonhard Stejneger, remarks:

The distinctive characteristic of the reptile collection in the Museum is in the completeness with which it illustrates the geographical distribution and morphology of the species inhabiting North America. In this respect it stands unrivaled. As the depository of the types of the species described by Baird, Girard, Kennicott, Cope, and other distinguished American herpetologists it also takes first rank.

The importance of the individual collections must therefore be judged with reference to their richness in such types and the advance in our knowledge of the reptiles and batrachians of this continent that has ensued. The collections which have undoubtedly contributed most in these respects are those of the Pacific Railroad surveys, the first Mexican-United States Boundary Survey, and the Wilkes Exploring Expedition.

The collection of fishes are almost exclusively North American, with one notable exception in the case of the deep-sea fishes dredged by the United States Fish Commission steamer *Albatross* in the North Atlantic and North Pacific. The latter collection is of equal importance with that of the *Challenger* expedition, if it does not surpass the same, and formed the basis of the recent work of Dr. Goode and Dr. Bean on "Oceanic Ichthyology."

The department contains the most extensive collections of fresh-water and littoral fishes of the United States anywhere assembled, consisting chiefly of the great series formed by the United States Fish Commission, supplemented by the collections of many American naturalists. The collection of Alaskan fishes is very large and is not extensively duplicated elsewhere.

The series of fishes collected in connection with the Pacific Railroad surveys and the first Mexican Boundary Survey are of special importance as containing the types of a large proportion of the species of the middle and western United States. They have been supplemented in recent years by important series collected under the auspices of the Fish Commission and by private collectors.

[1] Contributions to the Natural History of Kerguelen Island, made in connection with the American Transit-of-Venus Expedition, 1874–75, being Bulletin No. 3, United States National Museum. Also "Description of Nests and Eggs of some New Birds, collected on the Island of Aldabra, Northwest of Madagascar, by Dr. W. L. Abbott." Proceedings of the United States National Museum, Vol. XVII, 1894, pages 39–41.

The department contains also many single specimens of great value, which have been made the basis of new families and genera.

Regarding the Department of Mollusks, Mr. William H. Dall, the honorary curator, writes as follows:

The collection of mollusks was founded primarily upon the specimens gathered by the United States Exploring Expedition under Wilkes during 1838–1842, which formed the types of the folio volume on the mollusks and shells by Dr. A. A. Gould, included in the series of United States Exploring Expedition reports published by Congress. To these were added the types of the mollusks of the North Pacific Exploring Expedition under Ringgold and Rodgers, collected by Dr. William Stimpson, and described by Gould. The collections were very rich and valuable, for the time, but underwent serious vicissitudes before and after being received by the Smithsonian Institution previous to the organization of the Museum, so that the series as it now exists is by no means complete. Nevertheless these shells form an interesting and important portion of the collection.

Next in point of number and value comes the collection, especially of Unionidæ, given by Dr. Isaac Lea, and subsequently enriched by his son-in-law and daughter, the Rev. and Mrs. L. T. Chamberlain. This collection is, in its specialties, the fresh-water mussels of the world, unrivaled for extent and value, comprising an enormous number of types and having full data in relation to the habitat, etc., in nearly every case.

Almost as important for the mollusks of Great Britain, Northern Europe, the Mediterranean, and especially for the various deep-sea dredging expeditions sent out under British auspices before the *Challenger* expedition, is the Jeffreys collection, purchased from Dr. J. Gwyn Jeffreys, and comprising the results of nearly half a century of active collecting, exchanging, and purchase—in all some 25,000 lots of specimens, by far the most important and complete series of British shells in existence, and forming the basis of some hundred publications.

The fauna of West America, both littoral and deep-sea mollusks, is represented by the combined collections of Robert E. C. Stearns, William H. Dall, the United States steamer *Albatross* of the Fish Commission, the Arctic cruisers of the United States revenue marine, and many private donations, in all comprising the most complete existing representation of the fauna, with full data in nearly every case.

The fauna of the east coast of North America is represented by the unrivaled collections of the United States Fish Commission, augumented by a series of those of the *Blake* and many private collectors in the West Indies and on our Southern coast.

The land and fresh-water shells of North America, apart from the fresh-water mussels, are represented by the best existing collection derived from many sources, including types of Binney and Bland, Lea, Lewis, Dall, Stimpson, and many others.

To sum up, the collection of mollusks has the best series in the world, supplied with the fullest data, in the modern sense, of the land, fresh-water, shore, and deep-sea mollusks of North America, the Arctic regions, the North Atlantic and Pacific, and the British Islands. In the total number of specimens, the collection is the largest in the world, including over six hundred thousand specimens of dry shells and five thousand jars af alcoholic molluscan material. The collection of Cenozoic fossil shells comprises the largest existing series of the Tertiary fauna of the United States, and probably the largest series of Antillean Tertiary shells in any museum, though much remains to be done in naming and classifying the fossil material.

It may be said without fear of contradiction that for the regions mentioned the Department of Mollusks is unrivaled, not only in the amount and variety of material it contains, but especially in the full and correct data recorded in respect to the specimens, and which give to them a really scientific value, which is wanting in most of the great collections of the world, which were mostly made at a period when the importance of such data was not fully recognized. No other collection contains

nearly as many American and British type specimens; and only the British Museum rivals ours in the number of species represented from the whole world. No other collection has so large a representation of deep-sea mollusks and brachiopods, for the study of which the national collection is indispensable.

Of the Department of Insects, Dr. L. O. Howard, the honorary curator, writes:

Taking the collection as a whole, and aside from the consideration of the individual collections of which it is composed, I should say that its most important features are, first, the rapidly accumulating number of types in all orders, amounting already to more than 3,500 species; and, second, the biologic features of the collection, due largely to the fact that the original deposit by Dr. Riley was mainly biologic in its character, and to the further fact that the biologic accumulations of the United States Department of Agriculture for seventeen years, which have been very great, are now in the possession of the Museum.

The subjoined statement refers to the source of the different collections now brought together. Looking at the collection as a whole, however, the departments which stand out conspicuously are (*a*) the collection of North American Noctuidæ (probably the most complete in existence), (*b*) the collection of parasitic Hymenoptera (undoubtedly the largest collection of bred specimens in the world), (*c*) the orthopterous family, Acridiidæ, (*d*) the homopterous families Coccidæ, Aphidiidæ, and Psyllidæ (without doubt the largest accumulation of North American species), (*e*) the dipterous families Syrphidæ and Empidæ, (*f*) the collection of Myriopoda.

The department is at present in excellent working condition. It contains a very great amount of material in all orders, and in many unusual directions surpasses any collection in the country. Among others the following are of special interest:

1. The large collection, in all orders, of Dr. C. V. Riley.
2. All of the material gathered during the past eighteen years by correspondents, field agents, and the office staff of the Division of Entomology, United States Department of Agriculture.
3. The greater part of the collection of Asa Fitch.
4. The large collection, in all orders, of G. W. Belfrage.
5. The collections in Lepidoptera and Coleoptera made by Dr. John B. Smith down to 1889, together with the types of the Noctuidæ since described by Dr. Smith.
6. The collection of Lepidoptera of O. Meske.
7. The collection of Lepidoptera of G. Beyer.
8. The collection of Coleoptera of M. L. Linell.
9. The bulk of the collection, in all orders, of H. K. Morrison.
10. The collection of Diptera of Edward Burgess.
11. The type collection of Syrphidæ made by Dr. S. W. Williston.
12. The collection of Ixodidæ of Dr. George Marx.
13. The collection of Myriopoda of C. H. Bollman.
14. Sects of the neo-tropical collections of Herbert H. Smith.
15. The collection of Hymenoptera of William J. Fox.
16. The collection of Tineina of William Beutenmüller.
17. The large Japanese collection, in all orders, of Dr. K. Mitsukuri.
18. The African collections, in all orders, of Dr. W. L. Abbott, William Astor Chanler, J. F. Brady, the Eclipse expedition of 1889–90 to West Africa, and of several missionaries.
19. The large collection from south California of D. W. Coquillett, in Coleoptara, Hymenoptera, Lepidoptera, and Orthoptera.
20. The Townend Glover manuscripts and plates.

In addition to this material, there are minor collections which have been the result of the work of Government expeditions, or are gifts from United States consuls and many private individuals.

The most beautiful, and in many respects the most important, of the numerous series in the Department of Marine Invertebrates is the collection of corals made by the United States Exploring Expedition, and described by Dana. It includes many types of new forms. The great deep-sea collections from the North Atlantic and North Pacific, made by the United States Fish Commission, deserve notice; as do also the exhaustive collections from the New England Coast and the Fishing Banks, and from the west coast of Alaska, received from the same source. All the collections are very rich in the types of new species and higher groups.

Among the notable specimens in the Department of Comparative Anatomy should be mentioned the skulls and partial skeletons of the great extinct Arctic Seacow (Rytina); several skeletons of huge Galapagos Tortoises; and an unrivaled series of bones of the Great Auk. The collection is rich in skulls and skeletons of the various species of porpoises.

In the Department of Geology the following series and separate objects are pointed out by Dr. George P. Merrill as deserving special mention:

1. The Leadville, Colo., collections of rocks and ores, comprising some 380 specimens, illustrating the work of S. F. Emmons and Whitman Cross.[1]

2. The Washoe collections, comprising 198 specimens, as selected and studied by George F. Becker.[2]

3. The collections of the Fortieth Parallel Survey. These comprise some 3,000 specimens of eruptive and sedimentary rocks collected by members of the Fortieth Parallel Survey, under the direction of Clarence King, in 1867–1873. The eruptive rocks of the series were described by Prof. Ferdinand Zirkel.[3]

4. The Hawes collections. These comprise some 350 specimens of eruptive altered rocks, representing in part the work done by Dr. Hawes in connection with the New Hampshire surveys.[4] It also includes the small fragments described in his paper[5] on the Albany granites and their contact phenomena.

5. The Pacific Slope quicksilver collections. These comprise several hundred small specimens (mostly 4 by 6 cm.) of rocks and ores from the quicksilver regions of the locality above noted, as collected and described by G. F. Becker[6] and colleagues in "Geology of the Quicksilver Deposits of the Pacific Slope."

6. Pigeon Point collections. These comprise 400 specimens illustrating various contact phenomena, as occurring at Pigeon Point, on the north shore of Lake Superior, and as described by Prof. W. S. Bailey in a bulletin[7] of the United States Geological Survey.

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[1] Emmons, Samuel Franklin. "Geology and Mining Industry of Leadville, Colo., with atlas." Monograph XII of the United States Geological Survey, 1886.

[2] "Geology of the Comstock Lode and the Washoe District, with atlas." Monograph III of the United States Geological Survey, 1882.

[3] "Microscopic Petrography," United States Geological Explorations of the Fortieth Parallel, Vol. VI, 1876.

[4] "The Geology of New Hampshire," Concord, 1878, Vol. III, part IV.

[5] American Journal of Science, 1881, Vol. XXI, pages 21–32.

[6] Monograph XIII of the United States Geological Survey, 1886.

[7] "The Empire and Sedimentary Rocks on Pigeon Point, Minnesota, and their Contact Phenomena," 1893. Bulletin No. 109.

7. Menominee Valley and Marquette River collections. These comprise 254 specimens illustrative of the dynamic metamorphism of eruptive rocks as described by Prof. George H. Williams.[1]

8. The Eureka (Nevada) collection, comprising some 506 specimens, rocks and ores, as studied and described by Arnold Hague,[2] Whitman Cross, and J. S. Curtis.[3]

9. The Cripple Creek (Colorado) collections. These comprise some 800 specimens of rocks and ores. The material studied by Whitman Cross and R. A. F. Penrose and described in their report on the "Geology and Mining Industry of the Cripple Creek District."[4]

10. The Silver Cliff collections, comprising 300 specimens of rocks and ores. The collection upon which is based the report by Whitman Cross and R. A. F. Penrose.

11. The Tenth Census collection of building and ornamental stone comprises some 3,000 specimens, mainly in the form of 4-inch cubes, and 2,000 thin sections.[5] These formed the basis of the results given in "The Collection of Building and Ornamental Stones; a Handbook and Catalogue."[6]

12. The Tenth Census collection of iron ores, comprising some 2,200 hand specimens and 506 thin sections. This formed the basis of Prof. Raphael Pumpelley's report.[7]

13. The collection illustrating Kirkaldy's experimental inquiry into the mechanical properties of Fagersta steel.

14. Collections from the Archæan division of the United States Geological Survey made in Vermont and Massachusetts, and forming the basis of the petrographic work to be published in a forthcoming monograph.[8]

Among the materials of greatest historical importance may be mentioned:

(*a*) A mass of iron smelted by members of the Frobisher expedition during their stay at Frobisher Bay in 1578.

(*b*) A piece of metallic tin smelted by Dr. T. C. Jackson in 1840 from ore found at Jackson, Carroll County, N. H., and believed to have been the first tin smelted in America.

(*c*) The first steel car axle made in America and bent cold

(*d*) Copper medal. Struck from the first copper produced in Colorado in 1866.

(*e*) Placer gold. First gold discovered in California, from tail race 200 yards below the mill, panned by J. W. Marshall on the evenings of the 19th and 20th of January, 1848. Marshall's Claim, Sutter's Mill, Coloma, El Dorado County, Cal.

(*f*) Sample of petroleum from the first flowing well in the United States. Drilled in 1829 near Burkesville, Ky.

Among the more striking collections of the exhibition series may be mentioned the one illustrating limestone caverns and associated phenomena. This includes not only a large and variegated series of stalagmitic and stalactitic minerals, but also representative forms of animal life such as inhabit caverns. The collection as a

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[1] "The Greenstone Schist Areas of the Menominee and Marquette Regions of Michigan." 1890. Bulletin No. 62 of the United States Geological Survey.

[2] Hague, Arnold. "Geology of the Eureka District, Nevada, with Atlas," 1892. Monograph XX of the United States Geological Survey.

[3] Curtis, Joseph Story. "Silver-lead Deposits of Eureka, Nevada, 1884." Monograph VII of the United States Geological Survey.

[4] Sixteenth Annual Report of the United States Geological Survey, part II, 1894–95.

[5] Merrill, George P. "Special reports on Petroleum, Coke, and Building Stones, Tenth Census of the United States," 1880, Vol. X.

[6] Report United States National Museum, 1886, page 277.

[7] Report on the Mining Industries of the United States, with special investigations into the iron resources of the Republic, and into the Cretaceous coals of the Northwest. Vol. XV.

[8] See also Thirteenth and Fourteenth Annual Reports of the United States Geological Survey.

whole is doubtless the most complete and systematic of its kind in any museum in the world.

In the economic section are very full and systematic collections illustrating the mineral resources of the United States, arranged geographically, and also a systematic series in which minerals of the same nature and from world-wide sources are arranged by kinds. This collection comprises probably not fewer than 10,000 specimens.

Mr. F. V. Coville, honorary curator of the Department of Botany, furnishes the following brief account of the collection of plants:

With reference to the collections in the Department of Botany, it may be said that they constitute what is commonly known as the National Herbarium. The nucleus of the herbarium consisted of the plants collected by the Wilkes exploring expedition during the years 1838 to 1842. To these were added later the material from the North Pacific exploring expedition of Ringgold and Rodgers, followed by those of Frémont, the Mexican Boundary Commission, the Pacific Railroad surveys, and all the later explorations and expeditions of the Government.

In recent years the largest amount of material received has come from the Division of Botany in the Department of Agriculture, material brought together in the pursuit of the investigations of that establishment. Especially noteworthy among these is the collection of grasses which Dr. George Vasey gathered during his studies of the forage plants of the United States during a period of about twenty years.

To the collections of the exploring expeditions and those of the Department of Agriculture has been added a large amount of material donated by American botanists or purchased from collectors, besides large consignments of plants received from various foreign institutions or individuals principally as gifts or in exchange.

The collections of the exploring expeditions and the collection of grasses are especially rich in type specimens.

Mention should be made of the collections of George Joad, comprising about 10,000 species of representative plants of the globe, more especially those of Europe; and the collection of Prof. Lester F. Ward, comprising the specimens on which his "Flora of Washington and vicinity" is based, in addition to important collections made by Professor Ward and his correspondents in other parts of the United States. Both the Ward and the Joad collections were acquired by the Museum in 1885.

The important collections of the Department of Minerals are summarized by Mr. Wirt Tassin, assistant curator, as follows:

At the request of Prof. F. W. Clarke, the honorary curator, I have prepared, and transmit herewith, a list of some of the most important collections and single objects in the Mineral Department. They are:

The Isaac Lea collections, including a collection of minerals, a collection of micas and quartzes, and a collection of gems and ornamental stones, among which may be noted as of especial interest a fine green tourmaline of 57 carats, a red specimen of 18 carats, and a hair-brown one of 16 carats, from Mount Mica, Paris, Me; a doubly terminated emerald crystal from Stony Point, Alexander County, N. C., one of the largest ever found, measuring 3.1 by 2 inches and weighing 8 ounces and 3 pennyweights; a crystal ball cut from North Carolina quartz; a silver nugget weighing 448 ounces, from near Globe, Ariz; one of the largest known cut Ceylon essonites; four large Ceylon asteria; a fine suite of opals in argillaceous limonite, Baracoo River, Queensland.

The Leidy collection of minerals, received from the United States Geological Survey.

A series illustrating the occurrence and associations of the zinc and lead minerals of southwest Missouri, collected by W. P. Jenney.

A series illustrating the mineralogy of the Pikes Peak region, collected by Whitman Cross, of the United States Geological Survey.

A series of original and type zeolites from Table Mountain, Gunnison County, Colo., collected by Whitman Cross, of the United States Geological Survey.

A series of uranium minerals used in the work leading to the discovery of nitrogen in uraninite and later of argon, given by Dr. W. F. Hillebrand.

A series of copper carbonates from Copper Queen mine, Arizona, a gift of the Copper Queen Consolidated Mining Company, through James Douglas, president.

A series of azurite crystals and associated minerals from the copper regions of Arizona, together with a series of vanadium minerals from New Mexico, collected by Dr. W. F. Hillebrand.

A series illustrating the occurrence and association of the zinc minerals of New Jersey, collected by Wirt Tassin.

The type specimens of warrenite.

A slab of sodalite, size 2 by 2 inches; a polished slab of labradorite, 2 by 2 inches; a slab of calcite crystals, 4 by 4 inches; two large sections of agatized wood from Arizona, deposited by the Drake Company; the Ontonagon copper bowlder; a series of Sicilian sulphur crystals; the Shepard collections of meteorites; the Ring or Irwin meteorite; a suite of meteoric irons from Canyon Diablo, Arizona, varying in weight from 964 pounds to a few ounces.

To the list may be added the Stroud collection, the Hawes collection, the Abert collection, the various accessions received at different times from the United States Geological Survey, and other smaller collections containing valuable material of scientific and other importance.

Of the Department of Paleontology, Mr. Charles Schuchert, assistant curator, writes:

The feature of greatest importance is that much of our material has served in Government reports and is the basis for the geological and paleontological work treating of the western part of our country. This fact is well exemplified in the great number of species which have served in description and illustration, many of which are the original type specimens. There are of such species 5,741. These are distributed in the sections of this department as follows:

Paleozoic invertebrate species	1,155
Mesozoic invertebrate species	1,024
Cenozoic invertebrate species	1,304
Vertebrate species	161
Paleozoic plant species (Lacoe collection)	504
Mesozoic and Cenozoic plant species	1,531
Insect species	62

The most complete series is the Lacoe collection of American Paleozoic plants, the labeled specimens of which alone number upward of 18,000, and of these more than 500 species have been described or illustrated by Lesquereux and White. This magnificent collection is the result of many years' accumulation, and cost upward of $50,000. It was donated to this Museum in 1891 by Mr. R. D. Lacoe, of Pittston, Pa.

The collection of Cambrian fossils is very large, and when Mr. Walcott shall have completed his studies upon this material it will be the most complete and valuable series of fossils of this system extant.

The Cretaceous collection is also quite extensive and represents much work by F. B. Meek, C. A. White, and T. W. Stanton.

The Tertiary collection of Mollusca is one of the conspicuous features of this department. This collection was accumulated chiefly by William H. Dall.

Among single objects the following deserve mention:

A composite slab of Lower Carboniferous fossils measuring 4 by 6 feet, and showing in high relief 106 crinoids (16 species) and other fossils.

A Lepinodendron trunk 3 feet wide and 30 feet long (Lacoe collection).

A series of 6 cycad trunks from the Lower Cretaceous of South Dakota.

Bones representing a nearly complete *Zeuglodon cetoides* from the Eocene of Alabama, and of which a life-sized restoration is exhibited.

Skulls and limb bones of the huge Cretaceous dinosaur, *Triceratops*, from Wyoming.

An excellent skeleton of the Irish elk, *Megaceros hibernicus* Owen.

The collections of the Department of Prehistoric Anthropology are thus described by the curator, Dr. Thomas Wilson:

There are three great stages of culture, or civilization, represented in this department, which are separated and installed according to locality.

The first, and probably the earliest, is that of western Europe, of which the Museum possesses an extensive collection, the largest in the United States, showing the culture of prehistoric man, from the earliest times down to the Bronze Age and the Etruscans, where it joins history.

The second great division represents the territory of the United States and British Columbia. This constitutes the bulk of the collection, and comprises the hatchets, axes, implements, and other objects of stone. The mounds of the Ohio and Mississippi valleys have yielded large representations of pottery.

The third stage of culture is that belonging to Mexico and Central America, variously called Aztec and similar local names. While it comprises many stone implements, it extends further and wider than either of the foregoing, having jade, obsidian, and gold objects and ornaments. Its pottery is fine and beautifully made and decorated, while some of the ruder pieces, representing gods, especially from Mexico, are made with a wealth of detail that has increased the difficulty of manufacture almost beyond the belief of possibility in savage life.

The display from South America is important, resembling the culture of Central America more than that of North America.

The department has one of the richest displays of prehistoric objects in the United States. It contains more than 250,000 objects, which it is impossible to name. They, however, are divided both technologically and geographically, and by comparison in these two regards the endeavor is made to determine the stage of culture and obtain some insight into the history of prehistoric man.

Regarding the Department of Ethnology, the curator, Prof. Otis T. Mason, writes:

The ethnological collection of the Museum relates chiefly to the North American Indians, but it includes also valuable series of objects from Polynesia, obtained by the United States Exploring Expedition, such as the old Tapa cloths and weapons, which are no longer obtainable.

The Eskimo collection is unrivaled. The collections of the Bureau of Ethnology and other Government surveys on the west coast of the Pacific Ocean in North America and in the Pueblo region of the southwestern United States are the most extensive and valuable ever assembled. Among single objects of high value and rarity may be mentioned a large jade knife from Alaska, obtained by E. W. Nelson; a fine series of boats and totem posts from the west Pacific Coast of America, by J. G. Swan. In the Powell collection there are rare old pieces of pottery from the ruined pueblos. A Hawaiian feather cloak, of large size and well preserved, also deserves mention.

I present the following list of the most conspicuous and useful collections in alphabetical order, by collectors:

A collection of great value from eastern Africa, Kashmir, and southeastern Asia, by Dr. William L. Abbott, of Philadelphia; a collection illustrative of the ethnography of Korea, by Lieut. J. B. Bernadou, U. S. N.; a collection from the department of education in Japan to illustrate the practical industries of this country, in com-

parison with the tools and appliances brought home by Commodore Perry; the collection of Dr. Franz Boas, illustrative of the ceremonial usages of British Columbia and the Northwest Coast; of Capt. John G. Bourke, U. S. A., gathered from Indian tribes in the United States during his long engagements on the frontier; of Dr. J. F. Bransford, U. S. N., pottery and other materials from the graves of Nicaragua; enormous collections from the great Interior Basin and Pueblo region to illustrate the costume and arts of the Shoshonean and Pueblo tribes, also materials gathered by James Mooney and others of the Bureau of Ethnology from the tribes in the Indian Territory; collection of Heli Chatelain, from Angola; large collection from the Chinese Imperial Commission in the Centennial Exposition in Philadelphia; a rare old collection from Liberia and vicinity, made by the Colonization Society of Washington; collection illustrative of the games of the world, by Stewart Culin, of Philadelphia; collections especially from South America made by the Government agents for the World's Columbian Exposition in Chicago; collections of William H. Dall, associated with Dr. Tarleton H. Bean and Marcus Baker, in various parts of Alaska; collections, well labeled, from the Tlingit Indians, by Lieut. George T. Emmons, U. S. N.; a small but extremely valuable collection from west Greenland, by Governor Fenckner; a precious collection of pottery and other objects from old ruined pueblos in New Mexico and Arizona, by Dr. J. Walter Fewkes; collection of William J. Fisher from the Eskimo and Aleuts on the Alaskan Peninsula, the Island of Kadiak and vicinity; collection of William M. Gabb from Central America; old and precious collections from Oregon and British Columbia, by George Gibbs; a small and rare collection from the west coast of South America, by Lieut. J. M. Gilliss, U. S. N.; a small and extremely rare collection from Fury and Hecla Straits, by Capt. Charles F. Hall; collections of the Geographical and Geological Survey of the Territories, by Dr. F. V. Hayden; small collection from north Greenland and Grinnell Land, by Dr. I. I. Hayes; collection from the Amazon River, by Lieutenant Herndon, U. S. N.; collection from the Ainos and northern Japanese, by Romyn Hitchcock; collections from the Indians of the western Great Lakes, by Dr. W. J. Hoffman; collections from the Swiss lake dwellings, by Prof. Joseph Jillson; collections from southeastern Japan, by P. L. Jouy; collections from the Mackenzie River district, by Mr. Robert Kennicott; royal gift from the King of Siam, through Gen. J. A. Halderman; collection from Cumberland Gulf, by Ludwig Kumlien; a priceless collection of antiquities from Puerto Rico, by George Latimer; collection from Bristol Bay, by Charles L. McKay; extremely valuable collection from Mackenzie River district, by Robert MacFarlane, of the Hudson Bay Company; collection from the Kongo region, by Dorsey Mohun; collection from the Sioux tribes of Dakota, by Dr. Washington Matthews, U. S. A.; an immense collection, covering many thousand numbers, from Alaska, by E. W. Nelson; collections from the Southwest and Mexico, by Dr. Edward Palmer; collections from Japan, by Commodore Perry, U. S. N.; collections from the tribes of Utah, by Maj. J. W. Powell, of the United States Geological Survey; collections from northern and central California, by Stephen Powers; collections from Kotzebue Sound and of the Hupa Indians from northern California, by Capt. P. H. Ray, U. S. A.; collection from Tibet, by W. W. Rockhill; collection from the Chukche country and Alaska, by Commodore John Rodgers, U. S. N.; collection from the Mackenzie River district, by B. R. Ross, of the Hudson Bay Company; collection from South America, especially Peru, by Lieut. W. E. Safford, U. S. N.; collection by Rev. George W. Samson, from the Holy Land; collection by Paul Shoemaker on the shell heaps of the West Coast, especially Santa Barbara Island; collection of Lieut. G. M. Stoney, U. S. N., from Kotzebue Sound; collection by James G. Swan, from the North Pacific Coast of America; collection by Talcott Williams, from North Africa; collection by Lieut. E. H. Taunt, U. S. N., from the Kongo region; collection of Dr. William M. Thomson, U. S. N., from Easter Island; collection of Hon. W. P. Tisdell, from the Kongo region; collection of Lucien M. Turner, from Labrador and North Sound; collection of Capt. G. M. Wheeler, U.

S. A., from southern California; collection of Capt. A. W. Whipple, U. S. A., from Southwest; collection of Rouncevelle Wildman, from eastern China; collection of the Wilkes Exploring Expedition from Polynesia to the West Coast of America.

In addition to those already named should be mentioned the various branches of the United States executive service, the Department of State, the War Department, the Navy Department, and the Department of the Interior.

Of the Section of Oriental Antiquities and Religious Ceremonials, Dr. Cyrus Adler writes:

This section comprises a small collection, interesting not so much because of the intrinsic value of the objects as because of the relation in which they are shown. It may be divided, according to religions and nations, into nine sections: (1) Biblico-Judaic, (2) Christian, (3) Mohammedan, (4) Egyptian, (5) Assyro-Babylonian, (6) Hittite, (7) Græco-Roman, (8) Brahman, (9) Buddhist.

Of the Biblico-Judaic section, the collection of manuscripts and editions of the Bible and its versions (forty-one in number) may be considered as the most important, having both a literary and paleographic interest. Next to this may be mentioned the collection of objects of Jewish ceremonials, which, besides being a complete set of the objects used by the Jews in their religious observances, is of much artistic and historical value.

In the Egyptian section the mummy with its cases and the facsimile of the "Book of the Dead" ranks foremost. In the Assyro-Babylonian section the most imposing objects are the two colossal composite figures and the model of a temple tower of Babel, the latter being unique. For purposes of the study of the mythology and culture of Mesopotamia, the collection of seals (upwards of 300 in number) is important.

The whole collection of Hittite casts (thirty-eight) is unique in America, and affords a basis for the study of the history and civilization of this people, who played such an important part in the ancient history of the Orient.

In the Græco-Roman division rank foremost the Serpent Column of Delphi and the reliefs of the pedestal of the Obelisk, both from the Hippodrome in Constantinople. These casts are unique.

In the Buddhist section there are some fine images of Buddha of carved wood and bronze, models of pagodas from Japan, and a rare collection of musical instruments as well as other religious implements from China.

A rare piece of mosaic, representing a lion attacking a horse, from an ancient temple in Carthage, also deserves especial mention.

The varied collections grouped together in the Department of Arts and Industries are not readily summarized, but the following statements of those having the most important series in charge will be of interest:

In the section of historical collections [writes Mr. A. Howard Clark, honorary curator] are exhibited personal relics of representative men and memorials of events and places of historic importance. The nucleus of the collection was the Washington relics transferred from the Patent Office in 1883, and these still comprise the choicest of the historical treasures, including, as they do, so many objects intimately associated with General Washington during his home life, as well as military campaigns. Furniture, porcelain, glassware, and ornamental articles from Mount Vernon, Royal Worcester vases presented to him by Samuel Vaughan, the Martha Washington china, presented by Van Braam, a beautiful Niederweiler bowl, personally presented in 1792 by the Comte de Custine, and a nearly complete dinner service of Chinese ware decorated with the insignia of the Society of the Cincinnati; and besides these, the tents, camp chest, field glass, and writing case used by Wash-

ington during the War of the Revolution, as also miniature portraits of the General and Martha Washington painted on wood by the artist Trumbull.

Next in importance to the Washington relics are the almost priceless memorials of General Grant—the saddle, sword, field glasses, and other objects used by him during his military career; all his commissions in the Army, from lieutenant by brevet during the Mexican war up through the several grades to general, and his certificate as President of the United States; handsomely mounted swords; and the great gold medal with which he was honored by Congress for his military services; many elegant gifts received during his tour of the world, including the beautiful jade vase and ornamented bell standard given him by Prince Kung, of China.

By the side of these treasures are valuable gifts to Presidents of the United States and to statesmen, soldiers, and other representative Americans; some Moorish guns, highly decorated with gold and coral, and a gold-mounted sword, gifts to Thomas Jefferson from the Emperor of Morocco; jeweled and gold-scabbard swords presented by citizens of States and cities for military bravery to General Ripley, Commodores Elliott and Biddle, Admiral Trenchard, Generals Hancock, Paul, and others.

Here, too, are exhibited the great gold medal presented by Congress to Joseph Francis for his service to the world as inventor of life-saving appliances; the beautiful vase presented to Professor Baird by the Emperor of Germany as the grand prize of the Berlin International Fishery Exhibition; the silver urn from the citizens of Baltimore to Commodore John Rodgers for his services in defense of that city during the war of 1812; the garrison flag of Fort Moultrie in December, 1860, when that fort was evacuated by Anderson; the war saddle of Baron De Kalb, who gave his life for American independence; the uniform worn by General Jackson at the battle of New Orleans, and many other individual objects of great historic value.

A most instructive historic treasure is the Copp collection of household objects and wearing apparel, illustrating the home life of the New England colonists from 1635 to the period of the war of the Revolution, the gift of Mr. John Brenton Copp.

As a precious treasure in memory of the immortal Lincoln, there is the original plaster life-mask. Equally interesting are the molds of the hands made by the sculptor Volk, in 1860, just prior to the nomination of Lincoln for President of the United States.

As a most conspicuous object, and a treasure as well, may be mentioned the original full-sized plaster model of Liberty by Crawford, from which was cast the bronze statue surmounting the United States Capitol.

Of the sections of Transportation, Engineering, and Naval Architecture and Physical Apparatus, Mr. J. E. Watkins, curator, writes as follows:

The collections in transportation, engineering, and naval architecture, although not great in extent, are particularly valuable on account of the historical interest of almost every object which has been collected and is now on exhibition. Notable among the objects is the cylinder of the first steam engine erected on the Western Continent, by Josiah Hornblower, in 1753, sixteen years before James Watt began his investigations of the properties of steam. The Museum has also been fortunate in obtaining the original machinery of the Stevens twin-screw propeller steamboat, constructed and operated in the year 1804, three years before Robert Fulton operated the *Clermont* on the Hudson River. The original multitubular boiler of the Stevens locomotive of 1825, which ran in Hoboken, N. J., four years before Stephenson's *Rocket*, also forms a part of this collection. A cylinder and other portions of the locomotive "Stourbridge Lion," the first locomotive built for traffic on the Western Continent, was obtained several years ago through the cooperation of Horatio Allen, who, in August, 1829, first ran this locomotive near Honesdale, Pa. The series showing the development of permanent way in America is unique, as is the

two collections of models showing the development of wheel vehicles and machinery of the steamboats invented by Rumsey, Fitch, Fulton, and Ericsson.

The Ramsden dividing engine, used in the last century to divide equally the circles of quadrants and other mathematical instruments, which is the earliest machine of this kind extant, also forms a part of the collection of apparatus. A very important and valuable recent addition to this section is the seismological apparatus, displayed at the World's Columbian Exposition in the Japanese exhibit, and since presented to the Museum by that Government.

The electrical collections contain objects of extreme importance and value. Among these may be mentioned one of the first three large horseshoe electric magnets, wound and experimented with by Henry, together with the battery, first motor, and other similar appliances constructed by Henry while in Princeton; and the original telegraph apparatus invented by Professor Morse. The original telegraph instrument from which was received the historic message, "What hath God wrought," in Baltimore, 1844, also forms part of this collection, together with objects illustrating the beginnings and development of the storage battery and electric incandescent and arc lamps, and other electrical apparatus.

The telephone which Johann Philipp Reis, of Frankfort, invented in 1860 is another object of much interest and value.

The collection of materia medica is probably the most complete and most carefully labeled collection of its kind exhibited in any museum. It is very full in many directions, and is especially rich in specimens of cinchona. Of the latter series Dr. J. M. Flint, U. S. N., the honorary curator, writes:

I regard the collection of cinchona products as the most important in the Materia Medica Section. This collection embraces specimens of nearly all the natural cinchona barks of South America, every variety of the cultivated product from the Government plantations in India, together with most of the cultivated sorts from Java, Ceylon, Jamaica, and Mexico. The India and Jamaica collections comprise also herbarium specimens of the leaf and flower, and in many cases the fruit of each variety of cinchona tree from which the bark is taken.

Of the section of Graphic Arts, Mr. S. R. Koehler writes:

This section was definitely organized in January, 1887, although its beginning goes back to at least the year 1884. From a very few specimens then on hand the collections in this section have increased to the number of 5,620 specimens at the present writing, but as many of the entries on the catalogue cover more than one specimen, it will be safe to say that the total number is about 6,000.

The aim of the section is to illustrate the various processes of making pictures by lines and masses, either black or in colors, by hand, or with the aid of machinery, and the application of these processes in the industrial arts. To reach this aim, all the methods of making pictures that have ever been essayed are eventually to be illustrated—and many of them are already illustrated—by the tools and materials used, by the product in the various stages of progress, and by historical examples showing the development of each process, from the invention to the present time.

In addition to the collections already noticed, the Museum possesses a good series of musical instruments, assembled under the immediate direction of Dr. Goode; a collection of porcelains, bronzes, and ivory carvings; a large and varied collection illustrating fisheries, which was brought together chiefly in connection with the Fisheries Exhibition of Berlin and London; a small forestry collection; a collection of foods; a collection representing the utilization of industrial products

derived from animals; a collection of fibers and textiles; and a series of objects illustrating the chemical composition of the human body.

I have already alluded to the work done by the Museum in the direction of supplying from its surplus the needs of other scientific and educational establishments.

This undertaking was inaugurated at an early date, as I have stated on a preceding page (p. 297), and already in 1866, at the end of the second decade of the Institution, 110,000 specimens from the collections had been distributed. At the close of the fifth decade, in 1896, the number had risen to 521,000 specimens. These included animals of every class and many geological and mineralogical specimens and plants.

Every State and Territory in the Union has received a share of these collections, and numerous institutions outside the United States have also been beneficiaries in the distribution.

The majority of these specimens were distributed without demand for or expectation of a return; but the National Museum has received from other institutions in exchange for the collections sent out a body of specimens amounting in all to perhaps one-third the number distributed. Important additions have been made to the Museum in this way, and, indeed, its surplus collections, owing to the comparatively small amounts available for purchases, have constituted its chief capital. The system of exchanges, however, has its limitations, which are soon felt. Few institutions carry large quantities of surplus material, and none, of course, dispose of their most precious possessions. Exchange, therefore, takes the place of purchase only to a limited extent.

The Smithsonian Institution has carried on the distribution of surplus specimens from its own collections as a part of its regular activities having for their object the diffusion of knowledge. The Government has shown its acquiescence in this policy, so far as the national collections are concerned, by several enactments making appropriations for the work and in other ways.

In 1878 the Museum began the publication of a scientific journal, which has become well known to the world of science under the name of "Proceedings of the United States National Museum." The object of this journal, as indicated in the "advertisement" inserted in the volumes, is "the prompt publication of freshly acquired facts relating to biology, anthropology, and geology; descriptions of restricted groups of animals and plants; the settlement of particular questions relative to the synonymy of species, and the diaries of minor expeditions." Eighteen volumes had been published to the close of 1895, containing in all no fewer than 1,100 papers, comprising 12,056 printed pages. All the papers relate directly or indirectly to the collections of the Museum and serve to make them known to specialists. The volumes include[1] a large

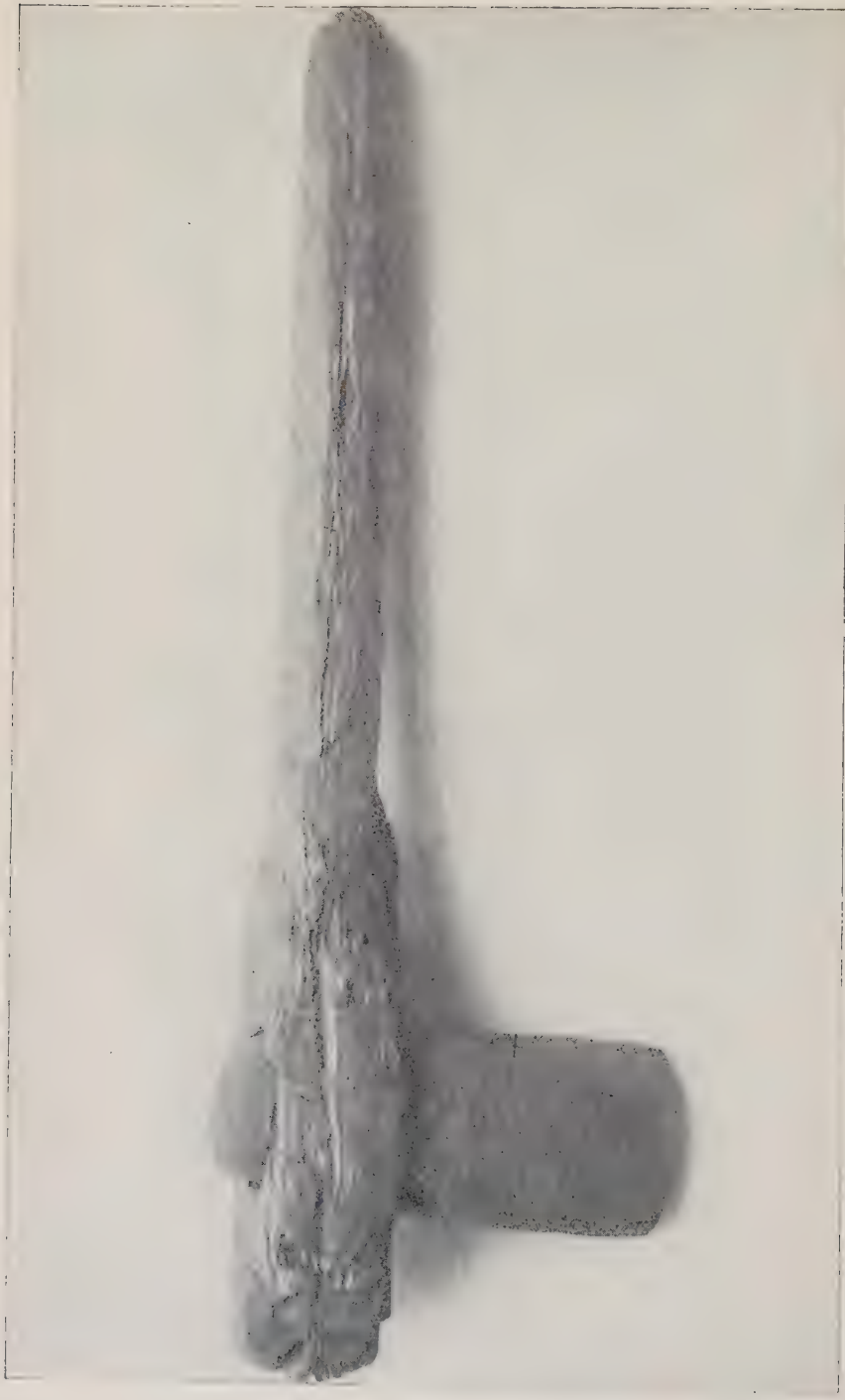
[1] With the "Bulletins" to be mentioned presently.

share of the scientific publications of the curators of the Museum, whose investigations have very naturally been based for the most part on the collections under their care. The "Proceedings" is a great storehouse of facts relating to natural history, and especially in the field of systematic zoloogy, but the work of every department of the Museum is reflected in its pages.

A few years before the establishment of the "Proceedings," in 1875, the Museum began the publication of a series of monographic works, under the general title of the "Bulletin of the United States National Museum," which in 1895 had reached 49 numbers. This series does not differ essentially in character from the "Proceedings," but comprises for the most part works too large to be conveniently included in the latter journal and generally of a more comprehensive scope.

The regular series of both "Proceedings" and "Bulletin" are in octavo, but the Museum has also published three numbers of the latter series, as "Special Bulletins," in quarto. Two of these contain "Life Histories of North American Birds, with special reference to their breeding habits and eggs," by Major Bendire, and the third, a treatise on "Oceanic Ichthyology," by Dr. Goode and Dr. Tarleton H. Bean.

The report of the Board of Regents of the Smithsonian Institution until 1884 consisted each year of a single volume in which was included a statement of the operations of the National Museum. The report of 1884, however, and those of subsequent years have been published in two volumes, of which one is devoted exclusively to a statement of the work of the Museum. In connection with the administrative reports contained in these volumes has been published a series of illustrated papers of a nontechnical character descriptive of various collections in the Museum. These papers have the same interest for nonprofessional readers that the technical papers in the "Proceedings" have for investigators, and the demand for them reveals a widespread interest in zoology, botany, anthropology, and those other subjects with which the work of the Museum has been most closely connected.



ABORIGINAL AMERICAN POLISHED STONE HATCHET IN ITS ORIGINAL WOODEN HANDLE.
Collection of Byron E. Dodge, Richfield, Genesee County, Michigan.
Cat. No. 148067, U.S.N.M. ⅓ natural size.

PREHISTORIC ART;

OR,

THE ORIGIN OF ART AS MANIFESTED IN THE WORKS OF PREHISTORIC MAN.

BY

THOMAS WILSON,

Curator, Division of Prehistoric Archæology, U. S. National Museum.

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PREHISTORIC ART; OR, THE ORIGIN OF ART AS MANIFESTED IN THE WORKS OF PREHISTORIC MAN.

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INTRODUCTION.

Art and science have, in these later days, come to be closely connected. Artists of all countries and periods are conditioned by the circumstances in which their lives are passed, and by the ideas prevalent among their peoples. Thus Art history becomes a function of social history, and can not wisely be disregarded by the student of the history of the human race. Ancient works of art bring us into contact with bygone peoples, and are often the only avenue whereby we can approach far-distant civilizations lying silent on the verge of time. Thus the study of Art history becomes a branch of Scientific inquiry. It has to be pursued by Scientific methods. Its results are of Scientific importance. It is a chapter, and perhaps the most pregnant chapter, of the Science of (Prehistoric) Anthropology, which seems destined in the near future to no insignificant growth. (Conway: "Art and Science.")

Art is the manifestation of human emotion externally interpreted by expressive arrangements of line, form, or color, or by a series of gestures, sounds, or words, governed by particular rhythmical cadences.[1]

Art is the harmonious expression of human emotion.[2]

These definitions are general, and include all kinds of art. Emotions, whether grave or gay, are thus manifested or interpreted; when by color, the art is painting; when by line, drawing or engraving; when by form, sculpture; and a combination of these may produce architecture. When the emotion is manifested by gesture or rhythmic movement it produces the dance; when by rhythmic notes, music; when by rhythmic words, poetry. These are the exterior signs by which the human emotions are manifested.

Each art is the peculiar language of a more or less extensive category of ideas and sentiments, to which it alone is able to give adequate expression.

Certain of the arts appeal to the brain through the organ o sight—painting, sculpture, engraving, architecture, and the dance; while certain others appeal through the organs of hearing—poetry, music, and

[1] Thoré, Salon de 1874, title Delacroix; Véron, Æsthetics, p. 89.

[2] W. J. Stillman, "Old Rome and the New."

the drama. In the former group, action is arrested and the representation is confined to a single moment of time; in the latter, the action is continuous.

But the laws governing both groups are the same. Their success requires concord and harmony between the external vibrations and the nerves which convey the impressions to the nerve centers.

A work of art is a material expression of its maker's delight. It excites the nerve centers and produces the sensations of delight or pleasure. We see or hear the artist's ideal through his work, and the success of his effort as a work of art depends, first, upon the brilliancy and clearness of his perception of his ideal, and, second, on his ability to translate and render this perception correctly. A copy, however accurate, even of the most beautiful scenes in nature, is not art. No artist can hope to equal the faithfulness of the photograph in reproduction, yet this is only the art of photography. A work of art is the ideal of the artist. It is his own thought; is a part of himself. Not nature as it actually is, but as he sees it, as he idealizes and then depicts it. It is this presentation of the ideality of artistic genius, whether in picture, statue, poem, music, the dance, in architecture, or what not, that stamps the work as one of art, and herein it differs from a mere mechanical copy, however accurate. It is this ideality of artistic genius which produces the sensation of delight.

Art is susceptible of several divisions. The commonest division is into fine, decorative, and industrial. It is not the intention of this paper to treat of industrial art *per se*. Fine art deals with painting, drawing, engraving, sculpture, architecture, music, poetry, and the drama. A division into prehistoric fine art may be made according to the material employed. Prehistoric decorative art explains itself.

The word "art" has different significations, according as it is used in the singular or plural form. When used in the singular form it relates to fine art; when in the plural, to industrial art. This linguistic distinction is continued in the designation of the workman; the one is an artist, the other an artisan. Sculpture in marble is undoubtedly a fine art, and the sculptor is an artist. Suppose his marble sculpturing is used for a magnificent chimney front in one of the mediæval chateaux of Europe, or his sculpturing in wood is used for a piece of furniture. It may then be either fine or industrial art, the line between them being extremely difficult to trace. The test of utility does not satisfy the conditions. Raphael's celebrated cartoons were designed for tapestries; Rubens made designs for similar purposes. Many recognized artists devote their best talents to making decorative designs for furniture, textiles, pottery, wall papers, book covers, and binding; while others equally well recognized find regular employment in illustrating our magazines and books; yet these are all industrial arts.

No attempt will be made to maintain the distinction between fine arts and industrial arts, nor to determine where the work of the artist

leaves off or that of the artisan begins. The work of the artisan is often quite as difficult to perform as that of the artist. It affords him as much pleasure; he takes as much pride in it, and puts as much sentiment into it, as does the artist. Nor can the test of utility be better applied, for some of the fine arts are highly utilitarian, while some of the industrial arts may be the reverse. If utility is to be the test, the lace maker, whether of point or bobbin laces, should be classed as an artist, for her work is always ornamental in contradistinction from utilitarian. It is only by this test that the sardine fish nets of western France are not to be classed as lace.

The idea sought to be presented is the extreme difficulty in distinguishing fine art from industrial art, the artist from the artisan; and the reader of the following pages is asked not to be critical in the author's application of the word "art."

Not infrequently a piece of work begins in industrial art and ends in fine art. The decorations in the Congressional Library building in Washington are examples. Much of the work began with the stonecutter and was finished by the sculptor; much of the wall decoration must have begun with the whitewasher and ended with an aggregation of the best artist painters in the country. The mosaic work also ran the entire gamut of art. So it may be in many of the arts mentioned in this book. The work may have begun with the rudest mechanism, as in flint chipping, and ended in specimens of great beauty, requiring the highest skill, representing sentiment or imagination, being purely ornamental, without utility, and intended to satisfy an æsthetic demand. In these the dividing line between fine art and industrial art is not attempted to be maintained, nor is this at all necessary. A manifestation of a high order of industrial art by prehistoric man comes equally within the scope of this paper as though it were recognized fine art.

Sir John Collier, in his "Primer of Art," says that decorative art is the making of something to please the eye, but as to what is pleasing, that each person must decide for himself. With this definition for a basis, about all we can say is that the objects made by the prehistoric man pleased him and he desired them. All beyond is mere theory—at least is to be referred to psychology for an answer. To answer why he desired these objects to be beautiful in addition to their being ultilitarian would be only speculation on our part.

Professor Haddon, in his work on "Evolution in Art," says that the most satisfactory method of procedure when dealing with difficult problems is to reduce them to their simplest elements and then investigate these simple elements before studying their more complex aspect. The author has proceeded along the lines of this advice. He has thus far taken not only a single people, but has taken them in a single locality, and has given all procurable evidence bearing on their art work, whether in its material or psychologic aspect. Through this we

are now in possession of all the information at present obtainable. Much more might be said of the man of the Paleolithic period in relation to his industry, his technology, possibly his sociology; but on the subject of his art and art work it is believed that the present paper will be found exhaustive. It furnishes the foundation upon which theory and speculation may be built ad libitum, but it is believed that the foundation is laid as broadly and as deeply as it can be in the present condition of the world's knowledge. What future discoveries may bring forth no one may venture to prophesy.

It is believed that these objects come within Sir John Collier's definition. They were something to please the eye of the man who made them, and for this reason, and apparently only this, he made most of them. What should have pleased him is (still quoting Sir John Collier) "what each person must decide for himself," and this man of the Paleolithic period appears to have decided that question in favor of these objects, and in accordance with that canon of his art he made the objects herein to be set forth.

Other aspects of art have been studied and written about by artists and historians from time immemorial. Their consideration opens a field for discussion into which we may not enter. We must content ourselves with this, which appears to be the very beginning of art.

The craving for decorative art and the desire for things beautiful are the common heritage of mankind. Former writers have speculated upon the origin of this craving and have believed it to be contemporaneous with the origin of art, and that they have declared to be as impossible of discovery as the origin of the attraction of gravitation. In this they have deceived themselves and have overstated the case, for it is respectfully submitted that in the following chapters the author has shown the beginnings of art, its earliest specimens, and by related specimens from the earliest people and their descendants confined to a single locality, given a comprehensive exhibition of the objects made, and the styles employed for their decoration; and this carries us back practically to the origin of art. No art objects earlier than these described here are known to have existed in any part of the world.

Professor Haddon[1] speaks of the needs of man which have constrained him to an artistic effort, and which he groups under the four terms of art, information, wealth, and religion. Æsthetic art he defines to be the study or practice of art for art's sake, the pleasure of form, line, and color. Omitting color, it is believed that the illustrations of prehistoric art shown in this paper come fairly within this definition. The objects figured and described show art work done for art's sake, to the end that the maker may obtain sensuous pleasure from form and line. Not only is it this, but it appears to be nothing else. All other terms of the group may be omitted so far as concerns the art work of this epoch. Man did not do this work for the sake of

[1] Evolution of Art, p. 4.

religion for, so far as can be understood, he had no religion, nor did he make these things for the sake of power or wealth. It does not appear that he considered himself in any way better off by having these objects decorated than he would if they had been plain. There are many hundreds of them which are entirely plain, of equal value for service, evidently utilitarian, without ornament or decoration, and apparently serving as weapons of the chase or war equally well with those highly decorated. Therefore these objects, beautifully designed as they may have been, were no addition to his wealth or his power, and as for information he was not busying himself about that. He gained information, it is true, by experience and his own effort, as he and every other human being did and will, but this wrought his own education and was not for the purpose of educating those around him. So this branch of the story ends where it began; he made these things because they were pleasing to him, and he (each man) decided for himself what was pleasing. These works of art were the material expression of the delight of their maker. The man of the Paleolithic period, savage though he was, had his ideal. The existence of these art works, the representation of the animals which he saw, of the plants and flowers which he must have recognized as beautiful, the existence of these in the caverns which he inhabited, and part of the possessions fabricated by him; their mere existence proves the fact of his ideality, proves that he had a taste and a desire, and are evidence of his gratification thereof. What other ideals he may have had we do not know; he has left no manifestation thereof. So far as we know man his tastes are continually changing, but whether the man of the Paleolithic period changed his tastes or not is not now determinable except so far as shown by his works, first of flint and then of bone, and finally of engraving and sculpture. It is only by these that we may know what were his tastes and what their changes.

Man does whatever art work he desires to. The outcome of his work is an expression of his ideal of beauty, of happiness, of goodness, of justice, and what not. When his taste or desire changes, his ideal changes, and with it his work. Everything that man does is done because he wants it to be done; it is his ideal. Human life is only a succession of ideals. The fashion in dress of the present day, why does it change? Why is the ideal of one season discarded the next? A change of taste is the only explanation. What produces this change? "Aye, there's the rub." Taste may be produced and may be changed by study and contemplation. Man is an imitative creature; he is gregarious; he loves to herd with his kind, to follow a leader, to be relieved from the necessity of study or contemplation of the needs of his life; he prefers to follow in the footsteps of his forefathers and the rut or route of civilization and culture which they have marked out for him. It is only occasionally, once in a generation, that some one being with a more energetic or ambitious desire or a greater

harmonizing power, greater analysis, higher judgment, better intellect, becomes a leader of those about him and out of his judgment or through his study or experience he discovers or develops new ideals and so changes the standards of taste and beauty for his generation. But there seems to have been practically no change of the ideals of the Paleolithic man in the center of France. So the flint chipping and bone polishing, while they might have been steps of evolution in man's progress, at last ended in the art objects presented in the first chapters.

The discussion of these abstruse, unknown, psychological questions is not here attempted, though the facts presented are pregnant with suggestions, which can not be here considered, as to the causes which impelled the wild hairy savage of Paleolithic times to produce these art works. We ask ourselves which of his tastes were gratified, which of his longings after the beautiful were satisfied, what folds of the brain or what parts of his nervous system were set into harmonious action, and why and how did the making of these designs produce pleasure in him as he made them, or how did they gratify him when he possessed them?

An examination of these questions would be aside from the author's intention and beyond his powers. He has no desire to enter into a philosophic, metaphysic, or psychologic discussion as to the origin of the art instinct in man or its evolution in his mind. This paper is a contribution to the history of art rather than to the science of art, and is intended as a record of the actual manifestations of art in the various epochs of human culture in prehistoric times, showing the earliest specimens, and thus presenting the idea indicated by the title "Prehistoric Art, or the Origin of Art as Manifested in the Works of Prehistoric Man."

The term "prehistoric" is used in this paper in the ordinary and usual sense, as being prior to history, before the beginning of history, meaning of course human history. As history can be only in writing, this means before written history. Prehistoric science does not depend on historical records made contemporaneous with the happening of the events recorded; it is based upon the evidence of the objects themselves. The discovery of these objects and the birth of the science of prehistoric anthropology lie within the present century. Prehistoric anthropologists have investigated these objects and the various deposits containing them as to (1) their human origin, (2) the geologic age of the stratum in which they are found, (3) their original deposit in that stratum at the time it was formed (that is to say, an absence of intrusion or disturbance), (4) the association and superposition of the implements and objects in the stratified deposits; and by the knowledge and experience thus obtained they have determined that man made these objects and, therefore, he existed in these localities in times of high antiquity.

This paper deals with the art of making and decorating these objects.

Not infrequently theories are advanced as to certain natural artistic manifestations of the human mind. Objections are made to arguments of contact between peoples arising from similarities of objects of art, industry, or decoration.

Mr. A. R. Wallace, speaking of the supposed migrations of the Swastika, says the cross made with two sticks, laid at right angles, would be the easiest, the most natural, and therefore the most likely sign to have been made first by primitive man.

We hear of the cosmic circle, the solar circle, the magic square, etc., as the "foundations of our original conception of the infinite." The sacred wheel of the law is spoken of as "common to all ancient cosmogonies invented for the world and all time. * * * The Ænead of spiritual principles, with their eternal relationships definitely determined by the sacred wheel, have been the inspiration," etc.

The attention of these and similar theorists is called to the fact that we have traced these art manifestations through three great epochs of prehistoric culture; that we have seen styles and designs of decoration without number, and we have to remark the absence of the cross, the circle, and the wheel. The Swastika made its appearance during the bronze age. It seems to have been the earliest known symbol[1] and was probably related to the cross, but except this, though the styles of decoration were principally geometric and made of dots and lines, the fundamental geometric forms of cross, circle, and wheel are not found.

I. PALEOLITHIC PERIOD.

Flint Chipping.[2]

The earliest manifestations of human art consisted of the chipping of implements of flint, practically the first known to have been made or used by man. They belong to the Paleolithic period of the Stone Age.

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[1] Wilson, The Swastika, Rept. U. S. Nat. Mus., 1894, pp. 757–1011.

[2] This is sometimes called "flaking," and perhaps with equal right. My preference is for the term "chipping," if for no other reason than because it is in more common and greater use. A distinction can be made between the two terms, between the objects which are obtained and the processes by which it is accomplished, though usually no such distinction is made. Webster in his definition of—

"Flake, *n.*," speaks of "(1) small collection of snow, (2) a platform of hurdles, (3) a layer or stratum," but nothing relating to the present question.

"Flake, *v. t.*, to form into flakes.

"Flake, *v. i.*, to break or separate into layers, to peel or scale off." We more usually say "to *flake off*."

The Standard Dictionary gives—

"Flake, *n.* 1. A small flat fragment or loosely cohering mass; a thin piece or chip of anything; scale; fleck."

According to Webster, the words "flake" or "flaking" have no reference either to the thing or process involved in this discussion. He says:

"Chip, *n.* (1) A piece of wood or other substance separated from a body by a cutting instrument, particularly by an axe. It is used also for a piece of stone sepa-

This period has been divided according to progress in human culture, and divers names have been given thereto, following the taste of the writers or discoverers. M. Lartet named the epochs after the animals associated with the implements and called them, respectively, the epochs of the Cave Bear, the Mammoth, and the Reindeer. M. Dupont, of Belgium, divided it into only two, and named the epochs after the Mammoth and the Reindeer. M. de Mortillet has divided it into five epochs, and has named them, respectively, the Chelléen, after the station of Chelles, a few miles east of Paris; the Acheuléen, after St. Acheul on the river Somme; the Mousterien, after the caverns of Moustier on the river Vézère, Dordogne; the Solutréen, after the rock shelter of Solutré near Macon; and the Madelainien, after the rock shelter of La Madelaine, Dordogne.

In later days the tendency seems to be to divide them otherwise. M. Cartailhac and M. Reinach, following Sir John Evans, are in favor of the first period being called the alluvium, and the second the cavern. All authorities are, however, unanimous in their agreement that this period and all these epochs, whatever they are to be called, belong to the Quaternary geologic period; that they were earlier than the

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rated by a chisel or other instrument in hewing. (2) A fragment or piece broken off; a small piece.

"Chip, *v. t.* To cut into small pieces or chips, to diminish by cutting away a little at a time, or in small pieces.

"Chip, *v. i.* To break or fly off in small pieces."

The Standard Dictionary says:

"Chip, *n.* 1. A small piece cut or broken off. (1) A small thin or flattish piece of wood or stone cut or chopped out. (2) A small fragment with at least one feather-edge, broken off from any hard or brittle body; spall."

According to the author's opinion, the definitions and differences are as follows:

A flake is that object which, of flint, is struck always by a blow, from a core or nucleus in large and usually long and thin pieces. The process by which this is made may be called "flaking." It is, or ought to be, confined to the single blow by which the flake is stricken off.

Chipping comprises all other methods of striking off pieces of flint. It may be used for preparing the nucleus, or for transforming the flake or other material or object into the implement desired.

The fine handiwork done on many, and, indeed, most, of the flint implements described in this paper, has been done by chipping and can not be regarded in any proper sense as that of flaking. The infinitesimal chips by which the deep notches, the fine points, the serrated edges, of spear and arrow-heads, by which the herring-bone handles of Scandinavian daggers and the broad and thin leaf-shaped implements are and have been made, and indeed by which all finely finished and delicately worked flint implements have been brought to their present condition, can not, with any degree of propriety, be called flaking, but should be called chipping. The pieces striken from these objects by the processes to which they have been submitted can not, without violence to the sense, be called flakes. It appears to the author much more proper to call them chips.

He is well aware that the implement of beaver's tooth used by the Eskimo has been called "the flaker," but this was only the determination or name given by its discoverer and has no other value than that of his opinion. The pieces pressed off with this implement are chips, and not flakes.

present geologic period, and that they came to an end before its beginning. The most certain, and therefore the most satisfactory, division has been that of M. de Mortillet, named after the various localities where the respective implements have been found in their greatest purity. I give my preference to it, subject to the correction incident to further discovery, if for no other reason, because it is more convenient. The names given are for localities, and consequently are purely arbitrary. They may not, perhaps, serve for general terms over the world, but within their own locality they have a definite and certain meaning; while to say the epoch of alluvium, the epoch of caverns, the epoch of the drift, or of the mammoth, bear, reindeer, etc., might have an application in other countries which would deceive the reader. The names Chelléen, Mousterien, etc., have no such application, and can not be applied to other countries. They indicate and describe only one kind of implement and one stage of culture, and, as definitions, they are exact. If other countries have other things to be described, if different epochs are found, then other names may have to be given; but when we speak now of these epochs, the Chelléen, Mousterien, etc., and the implements that belong to them, the speaker and hearer are on a common ground, and both use the terms in the same sense.

These epochs seem to have brought forth the earliest examples of æsthetic art. The man of this time has passed for a savage, and he doubtless was one. He had no tribal organizations, no sociology, no belief in a future state, no religion; he did not bury his dead, he erected no monuments, he built no houses; he was a hunter and fisher, he had no local habitation, dwelt in no villages except such as could be so called from a number of people living in a cavern for the purpose of shelter. Yet he occupied, in the Solutréen epoch, the highest rank as a flint chipper, and in the Madelainien epoch the highest place as an engraver on bone and ivory. His materials were the bones, horns, and tusks of the animals he killed. His tools or implements were sharply worked points or gravers of flint. Most of the specimens of art work are found in caves which had been his habitations. No one has sufficient knowledge to justify the declaration that all specimens of this art work belong to western Europe, but certain it is that most of the known specimens have been from that country. They are found chiefly in the caverns of central and southern France, and while about 400 specimens have been found and preserved, no one knows how many have been missed or remain undiscovered. The specimens found in caverns were originally thrown aside and lost in the débris, and have been protected by stalagmitic or other processes of induration. In making these excavations there is nothing to guide the searcher to the places where these are likely to be found. He must depend on his experience or good fortune. The specimens are usually enveloped in blocks or slabs, which by infiltration and induration became hardened, and must be quarried almost like stone. In bringing these blocks or

slabs to the surface or light many specimens are necessarily broken and lost and many others in the interior of the block or slab are never discovered. It is, of course, not known what number are lost in this, or, indeed, in any way, but the specimens being scattered throughout the mass with nothing to indicate their whereabouts, it would be strange if such was not the case. Specimens of these slabs or layers can be shown which would not only explain but demonstrate the truth of these assertions.

Plate 1 is a representation of a portion of the indurated floor of the cavern of Les Eyzies, and is taken from a specimen in the United States National Museum (Cat. No. 9106).

A few specimens of the art work of the Paleolithic period are purely decorative and without attempt to make representation of anything, but for the most part the objects were the animals of the period and locality. Many animals now extinct were represented, and in this way knowledge of their appearance has been preserved. The animals most frequently engraved were the mammoth, cave bear, Irish elk, musk ox, reindeer, chamois, mountain goat, urus or aurochs, horse, deer, and similar animals, and finally man. The marine animals were well represented—the seal, sea lion, tortoise, turtle, fishes, and serpents. Some of the objects thus treated were purely ornamental, while others were utilitarian; *bâtons de commandement*, poniard or dagger handles, and similar specimens were for utility, while other specimens were apparently intended as playthings. Many of them are so broken as to afford no clue to their purpose. This was the art of the Paleolithic period. That of the succeeding periods, the Neolithic and Bronze ages, was of a different style. It was almost entirely decorative and was etched or cut on pottery and bronze objects of utility. During this period there was only the slightest attempt on the part of the artists to represent living or material objects. The decorative art of that period consisted mostly of designs in geometric forms, as squares, circles, lozenges, chevrons, herringbones, zigzags, and crosshatch. Dr. Schliemann thought he found, upon some of the objects found in the Third City of Troy, representations of burning altars and occasional rude representations of animals like the hare. The Swastika seems to have been used throughout the latter period, and is believed to have been a symbol representing good luck, good fortune, long life, much happiness, etc., and to have been the first and earliest symbol in use among men.

These periods (Neolithic and Bronze) brought an entire change in the culture of man as well as in his art. He became sedentary, having a local habitation and place of residence. He became an agriculturist as well as a hunter and fisher; had a religion—at least he buried his dead as though in recognition of a future state. He built houses, constructed forts and fortresses; he built tumuli, mounds, and dolmens, and erected great stone obelisks, sometimes in groups and lines, which,

PORTION OF THE FLOOR OF THE PREHISTORIC CAVERN OF LES EYZIES, FRANCE.

Cat. No. 9106, U.S.N.M. Size, 12 inches.

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for want of a better name, are called alignments. He acquired the art of and became an adept in chipping, grinding, polishing, and drilling stone, especially the hard flint and tough jade, of which he left some magnificently wrought specimens. A few whistles have been found belonging to the Paleolithic period, but the greater proportion of them belong to the Neolithic period and Bronze age. The American Indian and his congeners, those on the West Indian Islands or Antilles, were in the Neolithic stage of culture and their decorative art was practically the same as of that age in Europe. They excelled their European brethren, however, in making rude drawings and pictures, principally petroglyphs, many of them, doubtless, ideographs, telling a story by their description. They often reproduce the human figure, which the European rarely did. The aborigines of Mexico, Central, and the northwestern part of South America, although still in the Stone age, reached a higher civilization, mainly manifested by their fine sculpturing of stone, the erection of extensive and magnificent temples, and their ideographic language.

No theory will be propounded in this paper, the only intention being to present facts on which arguments can be made and theories built. The sociology of the prehistoric man will not be essayed, and no *a priori* arguments will be introduced to explain the psychology of prehistoric man, nor will any philosophic treatise be attempted, giving pretended explanations of the causes which impelled aboriginal man to indulge in essays at æsthetic art other than the requirements of his condition or the suggestion of his fancy. To do this would be to substitute theory for fact.

The present paper will be devoted to Prehistoric art, and will not deal with Prehistoric anthropology. That subject is left to other works, a list of the principal of which is given in the author's Handbook,[1] published in the Report of the United States National Museum of 1887–88.

The Paleolithic period, the earliest epoch of the Stone age, obtained its highest known development in western Europe, possibly because it has been more profoundly studied there than elsewhere. By common consent it has there been subdivided into epochs according to the degrees of art manifested. Different names have been given to these epochs, and while there has been some dispute about details, the main proposition of a Paleolithic period earlier than the Neolithic has been accepted by all.

The peculiar characteristic of the implements of the Paleolithic period is that man's cutting implements, usually of stone, preferably flint, were always made by chipping. In the later epochs of the Paleolithic period certain implements were made of bone and horn, which were ground or smoothed, while those of stone were not. It is not, however, to be supposed that every chipped stone implement belonged to the

[1] A Study of Prehistoric Anthropology, p. 597.

Paleolithic period, for the prehistoric man of the Neolithic period chipped many implements of stone. All implements of flint, whether Paleolithic or Neolithic, were made partly or wholly by chipping. Arrow and spear heads, knives, scrapers, drills, perforators, and such, of whatever age, period, or epoch, when of flint, were made wholly by chipping, while many implements of stone made by grinding or polishing were first prepared by chipping or hammering. It is, therefore, proper that a paper on Prehistoric art should begin with flint chipping.

CHELLÉEN EPOCH (ALLUVIUM).

The beginning of flint chipping is found in the flint implements of the Chelléen epoch, called by some persons in Europe the Alluvial, by others the Cave Bear period.

M. de Mortillet, in his subdivision of the Paleolithic period, names this the Chelléen epoch after the station of Chelles (Plate 2), in the valley of the River Marne, a few miles east of Paris. This station was

Fig. 1.

QUATERNARY GRAVELLY DEPOSIT AT CHELLES, SECTION WHEREIN PALEOLITHIC IMPLEMENTS ARE FOUND.

Cleuziou, Creation de l'Homme et les Premiers Ages de l'Humanite, p. 172, fig. 98.

chosen as representative because the implements were there found in their greatest purity, though not in their greatest number. These have in England been called drift implements because they have been found principally in the river drifts or deposits. Their original position indicates the same antiquity as the gravel deposits themselves.

There was a time when the water of the rivers filled the valleys from hill to hill, pouring down with a rush its irresistible current, eroding the earth, and, if need be, the rock, to make for itself an outlet. As time progressed the water subsided and the current became less powerful. The sand and gravel which had before been carried out to the sea began to be deposited in this bend and on that point, until at last the deposit came to the surface of the water, and formed what is now the highest terrace. This narrowed the river and the terrace became a new river bank. This process was repeated again and again, until the river finally retreated to its present bed and left its terraces, sometimes

PREHISTORIC STATION OF CHELLES SHOWING ALLUVIAL DEPOSITS, IN THE VALLEY OF THE RIVER MARNE, 19 KILOMETERS EAST OF PARIS.

Cleuziou, Creation de l'Homme, p. 173, fig. 101.

three in number, the first being higher, deeper, and more distant from the river than the others. These are now marks of the successive stages in the formation of the river valleys.

The gravelly deposit of the River Marne at Chelles forms the plain of the river valley. It is from 22 to 26 feet in thickness (Plate 2). The sand and gravel rests upon the original chalk and is about on a level with the highest floods of the river in modern times. These deposits are of different degrees of fineness and are laid in strata or layers, showing that they were made by the action of the water (fig. 1). The strata are not always continuous, and they differ in thickness and position, showing the water to have had varying currents. Large, erratic bowlders are found occasionally. The sand and gravel are sometimes intercalated with other strata, which show a change in the surrounding conditions. The most frequent of these is an irregular stratum of calcareous cement. In other places are pockets or strata containing various solutions of iron, the percolating water from which gives the color to the implements described, and sometimes forms the cement itself.

There has been much discussion over the time and manner of the formation of these river valleys and the deposit of their sand and gravel as bearing on their antiquity. Such a discussion is unnecessary here, but all disputants are agreed that implements of human industry are found in these river gravels in positions which indicate their deposit at the time of the original formation and at a distance from the river and depth below the surface which indicate their antiquity to be equal with the earliest deposits. Whether they were swept down from the springs which formed the head waters of the river, were dropped on the borders of the stream in the near neighborhood, or precisely in what manner they became involved with the sand and gravel in which they are now found, is not only unknown but there has not yet been any entirely satisfactory theory developed.

A series of these implements is presented, side and edge views, so that the student may understand the differences between these and the thinner leaf-shaped implements and spearheads of other periods and epochs, with which they are not to be confounded. These differences are vital, and as they can not be brought out by a side view alone, an edge view is deemed sometimes indispensable. Some of the implements from Chelles are extremely crude and rough and belong to a very primitive industry, yet they may not be omitted from a work on Prehistoric art.

The Chelléen implements figured represent the standards for this epoch. They are mostly oval, with a cutting edge at the point, contrary to those of the Neolithic period. The body of the implement is thick, after the shape of an almond or peach stone, and not thin and flat, as a laurel leaf, like those of a later epoch. They were of flint where that stone was obtainable; where it was not, quartz and quartzite seem to have been employed. The flint always broke under a blow

with a conchoidal fracture, and this may frequently be seen. Some specimens were made from bowlders, and in chipping to a cutting edge or point the crust of the pebble was often left as a grip. Fig. 2 (Cat. No. 99440, U.S.N.M.) is one of these. It comes from the station of Thennes, in the river Arve, an affluent of the Somme, France. It has been finely chipped to a sharp cutting edge around one end. Fig. 3 (Cat. No. 11083, U.S.N.M.) represents one of the same type from Thetford, England. It shows the chalky crust for a grip, while the other end is chipped to a point, as though for digging rather than cutting. These pebbles both belong to the chalk formation, as do most of the flints from these countries. Fig. 4 (Cat. No. 35121, U.S.N.M.) represents a standard type of these implements from the valley of the Loire, central France. It is oval or almond-shaped, with the cutting edge at the point, but has been made of flint from a ledge, and not from a nodule or pebble. The entire surface, both sides and edges, has been worked by chipping, though the butt or grip is thicker and has its edges battered so that it can be better held in the hand. The hand may also have been protected against the sharp edges or corners by a bit of skin, fur, grass, or similar substance. It is doubted whether any of these implements were attached to a handle. It required great care and labor for the Paleolithic workmen to chip them to this sharp edge all around, and when so done it produced an implement the form of which was the most difficult to successfully insert in a handle. To make a firm attachment of an implement of this form, the handle must

Fig. 2.

PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED FLINT.

From the River Arve, at the prehistoric station of Thennes, France.

Cat. No. 99440, U.S.N.M. ½ natural size.

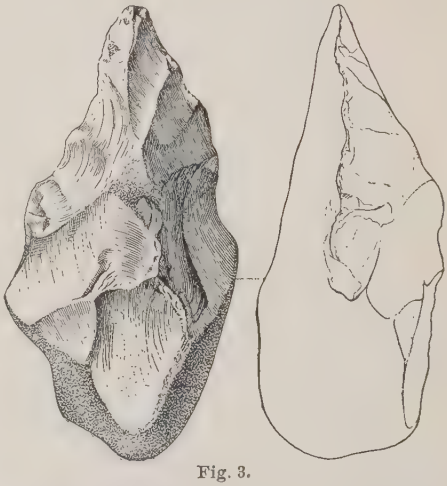


Fig. 3.

PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED FLINT.

Gravels of the Little Ouse, Norfolk, England.

Cat. No. 11083, U.S.N.M. ½ natural size.

envelop it at its greatest diameter, and herein lies the first difficulty. If the sharpened implement be insufficiently inserted it will drop out; if only partially inserted a few hard blows would split the handle; if it be inserted too far the same blow will drive it through.

The particular or special use of the Chelléen implement is unknown, though it may easily be surmised. The wise men of Europe have made many guesses and suppositions, but beyond the suggestion of a cutting or digging implement adapting itself to varying daily needs of the aboriginal man, all these are naught but speculation. Many of the implements bear undoubted traces of use on their cutting edges. Sir John Evans, in his latest work, reverts to his first and original opinion, that "it is nearly useless to speculate as to the purposes to which they were applied." Sir John Lubbock says:

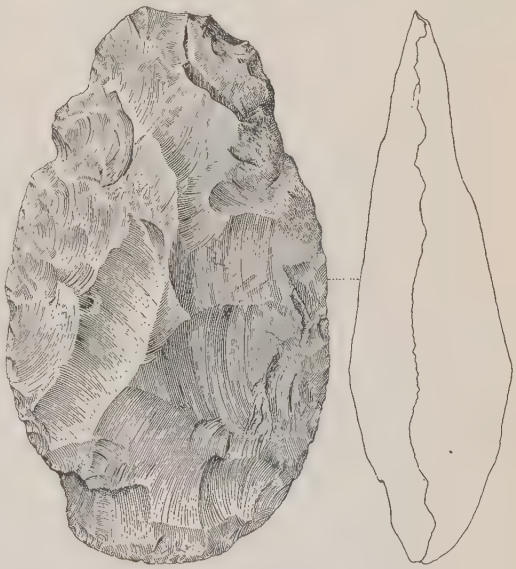


Fig. 4.
PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED FLINT.
Loire Valley, central France.
Cat. No. 35121, U.S.N.M. ½ natural size.

> Almost as well might we ask to what would they not be applied. Infinite as are our instruments, who would attempt, even at present, to say what was the use of a knife? But the primitive savage had no such choice of tools. We see before us, perhaps, the whole contents of his workshop, and with these weapons, rude as they seem to us, he may have cut down trees, scooped them out into canoes, grubbed up roots, killed animals and enemies, cut up his food, made holes in winter through the ice, prepared firewood, etc.

Attention is called to the relation of width to thickness of the specimens shown, especially in fig. 4, because this is a characteristic of Paleolithic types, and one of the recognizable differences between Chelléen and all other implements. This specimen is $3\frac{5}{16}$ inches in width and $1\frac{3}{4}$ inches in thickness—or the thickness is 53 per cent of the width. The average Solutreen and Neolithic leaf-shaped implements of this width are about three-fourths of an inch, or 22 per cent of the width.

The flint of which these implements are made has, in many specimens, passed, since their manufacture, through certain chemical and physical changes on the surface. Some show a certain brilliancy, in some the color has changed to red or yellow, and so on through the scale to chalky white. This change, called patina, is produced by contact with

the atmosphere or the earth, or with the water which has percolated through the earths in the neighborhood, generally those containing iron, and these have changed the chemical combination of the flint on its surface. This change sometimes extends deep into the stone, and in small specimens under favorable conditions may pass entirely through it.[1] In the United States all this might be called weathering; in France it is called patine. The objection to the former word is that it conveys, possibly involuntarily, some relation to the weather, while the patine may be formed on specimens deep in the earth. Dendrites are also formed on the specimens. These changes are evidences of antiquity of the specimens, and to the experienced eye become testimonials of its genuineness. Fig. 5 (Cat. No. 99457, U.S.N.M.) represents a slightly different form. It is longer, narrower, thicker, and is more pointed. Its length is $6\frac{1}{2}$ inches, width $2\frac{5}{8}$ inches, and thickness $1\frac{7}{8}$ inches, or 71 per cent. It comes from the forest of Othe, department of Aube or Yonne, eastern central France, and is one of the many surface finds of France. It has been strongly objected to similar specimens found in the United States that, being found practically on the surface, they are not evidence of a Paleolithic period; and the force of this objection is admitted. However, many such implements have been found on the surface of the high plateaus of western Europe, and they have always been considered as true paleoliths. This question is not to be argued here; those interested in it are referred to the handbook[2] previously cited, where some of the instances are stated and authorities quoted.

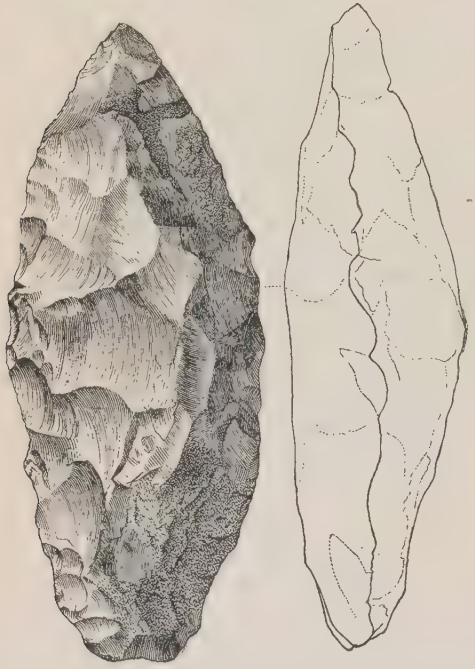


Fig. 5.

PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED FLINT.

From the (surface) forest of Othe, eastern central France.

Cat. No. 99457, U.S.N.M. ½ natural size.

It has already been remarked that most of the Paleolithic implements from western Europe are of flint, but all are not so. An exten-

[1] Geo. P. Merrill, A Treatise on Rocks and Rock-weathering, U. S. National Museum, New York, 1897.

[2] Page 611.

sive workshop for the manufacture of Paleolithic implements was found on or near the surface at Bois du Rocher not far from Dinan, France, by MM. Micault and Fornier, of Rennes. The material was quartzite, and chips, flakes, hammer stones, and unfinished implements, with the usual débris, were found, and along with them a number of finished implements, of which fig. 6 (Cat. No. 99541, U.S.N.M.) represents one. It has the same peculiarity of relative thickness as other Paleolithic implements, but is more disk-shaped than any heretofore shown.

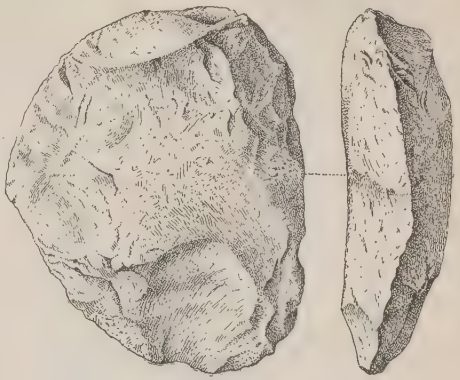


Fig. 6.
PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED QUARTZITE.
Bois Du Rocher, near Dinan, Brittany, France.
Micault and Fornier. Cat. No. 99541, U.S.N.M. ⅓ natural size.

Implements corresponding to those of the Chelléen epoch are found practically over the world. This would indicate the expansion of that civilization and the duration of the epoch to have been much greater than has been supposed. Those from Great Britain are found only in the eastern and southern portion from Norfolk around to Devonshire and Lands End. They have been found in every quarter of France and southern Belgium, in all parts of Italy, and in Spain and Portugal (fig. 7). They have not been found in northern England, Scotland, Wales, nor northern Ireland; neither in northern Belgium, nor Holland, nor in the Scandinavian countries, nor that portion of Germany bordering on the Baltic, nor in northern Russia. These countries may have been covered with glaciers at that epoch, or possibly by the great North Sea. Paleolithic implements have been found in Asia, in Palestine, in India from Bombay to Calcutta (fig. 8, Cat. No. 88190, U.S.N.M.),

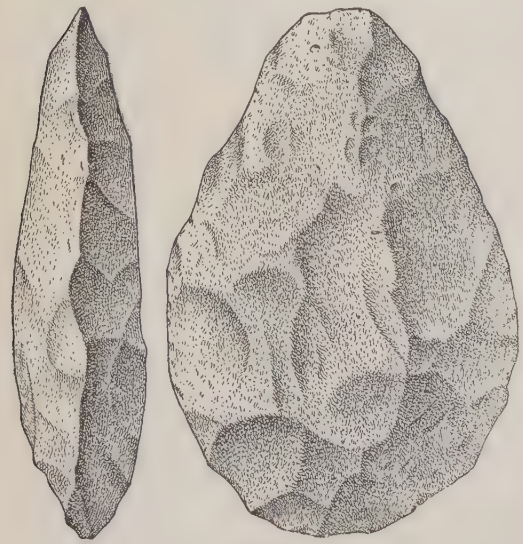


Fig. 7.
PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED QUARTZITE.
Leiria, near Lisbon, Portugal.
Cattailhac, Spain and Portugal, p. 30, figs. 23 and 24. ⅓ natural size.

in Cambodia, in Japan, in Africa (fig. 9, Cat. No. 170677, U.S.N.M.), up the valley of the Nile, and lately in the United States.

ST. ACHEULÉEN EPOCH (ALLUVIUM).

Some of the prehistoric archæologists of France have sought to make a subdivision of the culture of the Chelléen epoch and to denominate the specimens from St. Acheul near Amiens on the Somme River, France, by the name of that station. These specimens are thinner, with smaller flakes; are finer in their manufacture, and show an improved art of flint chipping. Fig. 10 represents one of these specimens. It is of flint, pointed, almond-shaped, showing part of crust of pebble left for grip, and with cutting edge at the small end.

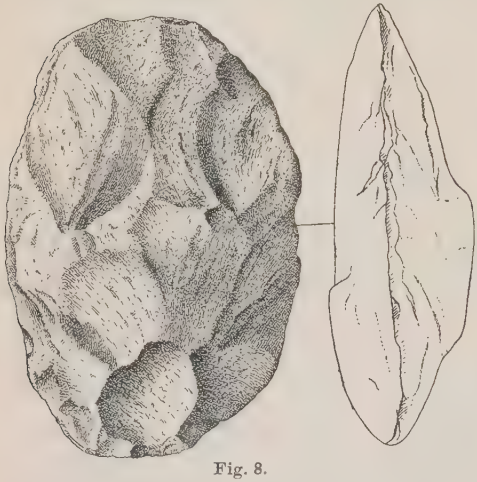


Fig. 8.
PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED QUARTZITE.
Laterite beds near Madras, India.
Cat. No. 88190, U.S.N.M. ½ natural size.

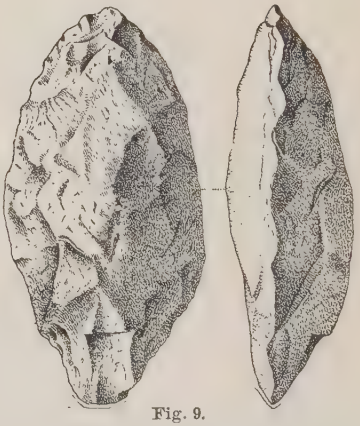


Fig. 9.
PALEOLITHIC CHELLÉEN QUARTZITE IMPLEMENT.
Africa.
Cat. No. 170677, U.S.N.M. ½ natural size.

FLINT IMPLEMENTS IN THE UNITED STATES.

Implements in large numbers have been discovered in nearly every State of the United States, bearing great resemblance in form, appearance, and mode of manufacture to the Paleolithic (Chelléen and St. Acheuléen) implements from western Europe and the localities just mentioned. If accepted as such, their presence would prove the occupation of America by a prehistoric race of the same culture status.

The investigation concerning these implements has not been very profound, nor has it been settled to the satisfaction of all prehistoric archæologists, perhaps not even to a majority, that they are truly Paleolithic implements. There have been various contentions concerning this. On this subject the author has formulated his conclusions as follows:

It is apparent on slight inspection that these implements found in the United States, although mostly on the surface, are of the same Paleolithic type as those found in the gravels of Europe and elsewhere.

No attempt is made to define Paleolithic civilization or culture, nor to describe the man who made or employed these implements. These implements are not declared to be either glacial or preglacial, yet they have been found in glacial gravels, and they are decided to be different from the implement common to the Neolithic civilization of America. Thus they furnish a working hypothesis indicating a stage of Paleolithic culture in America. This conclusion is expressed under all reserve, and subject to future discoveries. As a working hypothesis, it may stimulate investigators to search in such gravels, fluvial or glacial, as may be suspected of containing them. This might induce investigators and collectors to gather and save them as valuable to science, to note all objects, and to correctly report all possible information concerning them. In Europe, Paleolithic man belonged to a past geologic age called there the Quaternary; the objects of his industry were found associated with the remains of extinct animals usually fossilized, belonging to the aforesaid geologic epoch, and, therefore, if we are to find Paleolithic man in America in times of similar antiquity, we must call to our aid the science of geology. If Paleolithic man occupied America, whether he be the Indian or his ancestor, the implements will surely be found sometime and somewhere; and then those who are now opposed will agree. If the implements are not found, then those now favoring will be compelled to give it up. In any event, the investigation should be made, and no adverse decision is justifiable while the question is pending.

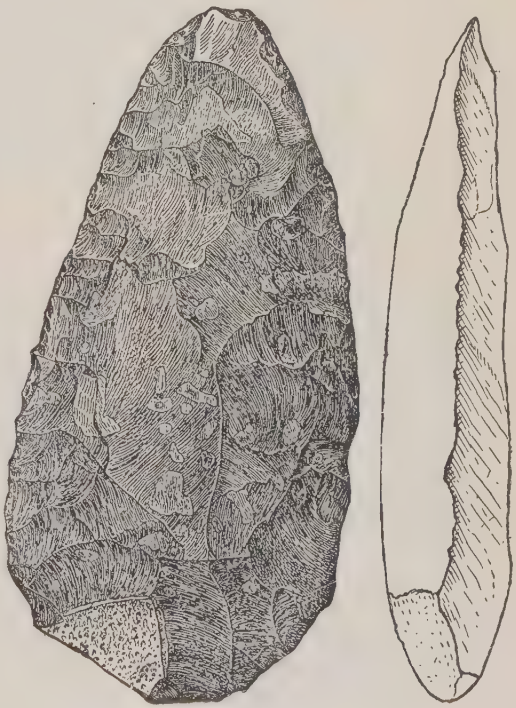


Fig. 10.

PALEOLITHIC ACHEULÉEN IMPLEMENT OF CHIPPED FLINT.
Gravels of the River Somme, at St. Acheul, France.
Cat. No. 137535, U.S.N.M. ½ natural size.

It is not intended to make here any argument favoring a Paleolithic epoch in America, but only to note the similarity in the early prehistoric times in the art of flint chipping in Europe and other localities with the same art in America. A series of implements from our country is here presented. Figs. 11 and 12 represent specimens from Texas;

13 and 14, those from Wyoming; 15, from Mount Vernon, Virginia. Plates 3 and 4 represent a series from the District of Columbia and Mount Vernon, Virginia, respectively.

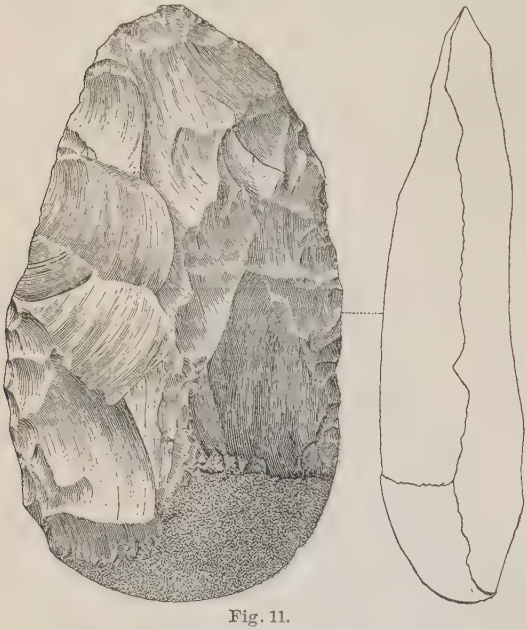


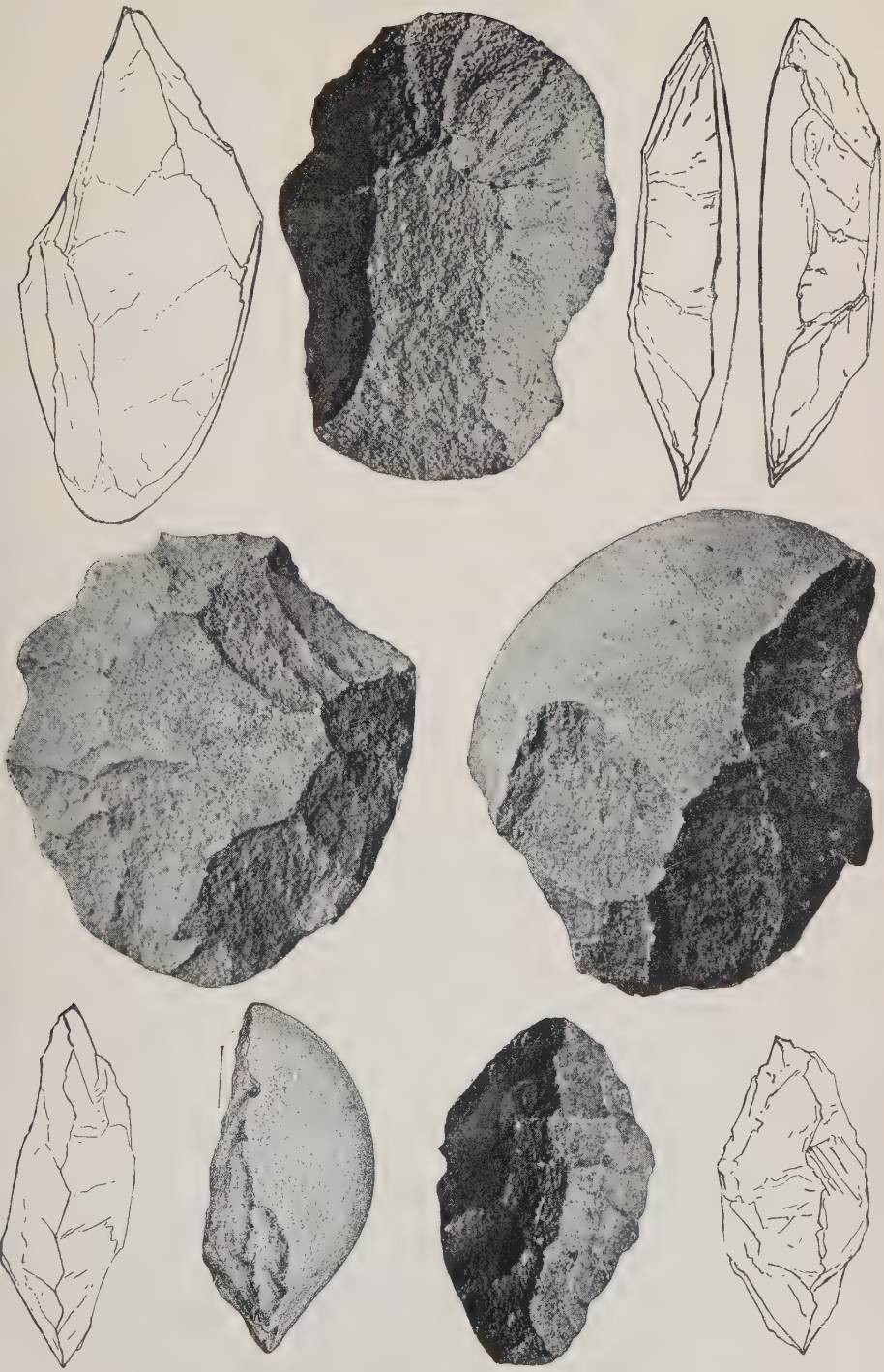
Fig. 11.
RUDE CHIPPED FLINT IMPLEMENT OF PALEOLITHIC TYPE.
Side and edge views.
Texas.
Cat. No. 21152, U.S.N.M. ½ natural size.

As examples of the earliest art products of man throughout the world, this series is inserted.

It has been contended that human occupation during the Cavern period in Europe was contemporaneous with the Glacial period, that the inhabitants had theretofore lived without particular habitations, and the climate being warm and moist, they were without particular need of any; but on the approach of cold, incident to glaciers, the inhabitants retreated to the caverns for warmth and shelter.

It appears certain that there was at the beginning of this epoch a material change in human art and industry. The Chelléen and St. Acheuléen implements, so widespread, were superseded by objects now found in the caves and rock shelters occupied by man. This statement might be doubted if it rested on a few objects, but its truth will be apparent when we consider that these implements have been found throughout western Europe by hundreds of seekers, in thousands of places, and to the number of tens of thousands, but *never associated* with *cave implements* or objects; while on the other hand, tens of thousands of cavern implements and objects have been found in their appropriate places and never associated *with Chelléen or St. Acheuléen implements.* I say *never*—if any have been thus found, the proportion is insignificant, not one in a hundred, so that the statement is substantially true.

Fig. 12.
RUDE CHIPPED FLINT IMPLEMENT OF PALEOLITHIC TYPE.
Side and edge views.
Texas.
Cat. No. 179789, U.S.N.M. ½ natural size.

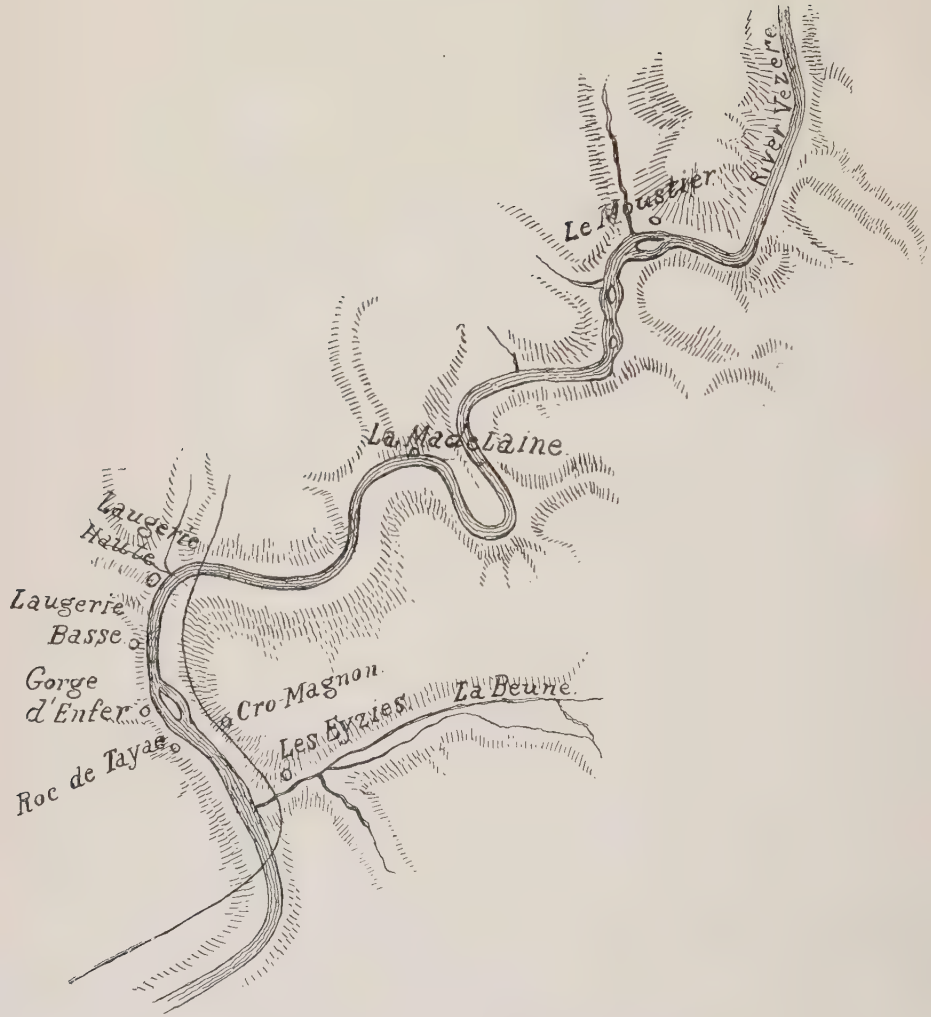


RUDELY CHIPPED QUARTZITE IMPLEMENTS OF PALEOLITHIC TYPE.

District of Columbia.

U. S. National Museum.

SERIES OF RUDELY CHIPPED QUARTZITE IMPLEMENTS OF PALEOLITHIC TYPE.
Mount Vernon, Virginia.
Cat. Nos. 136952, 150878, U.S.N.M. ⅓ natural size.



MAP OF THE RIVER VÉZÈRE (DORDOGNE), FRANCE, SHOWING SETTLEMENTS IN THE PALEOLITHIC PERIOD.

Scale, $\frac{1}{10000}$.

Hundreds of caves and rock shelters have been found throughout western Europe bearing evidence of their human occupation during this period. Many of them are located on the River Vézère, Dordogne. Plate 5 represents a map of the River Vézère, from Les Eyzies, where it empties into the Dordogne River, to Le Moustier, 10 kilometers above.

The principal prehistoric caverns in this neighborhood are Le Moustier, La Madelaine, Laugerie Haute and Basse, Gorge d'Enfer, Cro-Magnon, and Les Eyzies, but there are others smaller in size and less in importance. M. E. Riviére discovered a new cave during the summer of 1896.

Fig. 13.

RUDE CHIPPED IMPLEMENT OF PALEOLITHIC TYPE OF BLACK FLINT.

Side and edge views.

Wyoming.

Cat. No. 11535, U.S.N.M. ½ natural size.

In the summer of 1884 the author visited this locality and inspected and worked in some of these caverns. The cavern of Lé Moustier has been excavated to the bed rock throughout, and all traces of human occupation in prehistoric times removed. The principal objects of human industry found therein were points and scrapers, with cores, flakes, chips, débris, etc. On the plateau at the top of the cliff some of the smaller and finer specimens of the St. Acheuléen type have been found, with chips, cores, and débris. This has been presented as evidence of the relationship between the Chelléen epoch and the Mousterien, which succeeded it. It is remarkable, although alleged to be an undoubted fact, that these two localities, in such juxtaposition, should have furnished implements so different in style, type, mode of manufacture, and use, and have represented stages of culture so different. This has been accounted for on the theory of the intervention of the Glacial

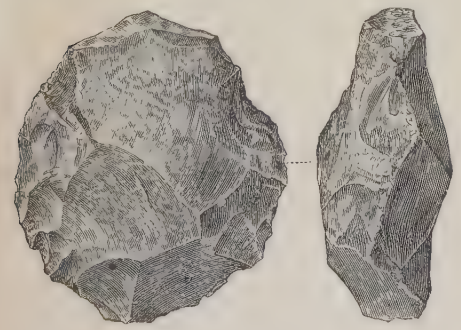


Fig. 14.

RUDE CHIPPED IMPLEMENT OF PALEOLITHIC TYPE, BROWNISH-YELLOW JASPER.

Side and edge views.

Wyoming.

Cat. No. 10543, U.S.N.M. ½ natural size.

period and that the two stages of culture represent man's adaptation of his art to the changed environment. In the earlier epoch the climate was warm, and man had apparently, or possibly, no need for shelter or clothing, as no traces of either have been found; all his implements were weapons, and suitable for the chase or, if need be, for war. In the later epoch the weapon became a spearhead or harpoon (more likely the latter), while a new implement, the scraper, is introduced, by which he is supposed to have utilized the skin of animals which he had killed by making them into clothing or coverings. The caverns which were his new habitations furnished him both shelter and warmth.

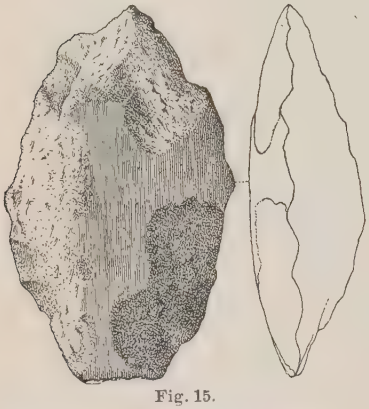


Fig. 15.

RUDE CHIPPED QUARTZITE IMPLEMENT OF PALEOLITHIC TYPE, MADE FROM A PEBBLE.

Side and edge views.

Mount Vernon, Virginia.

Cat. No. 1073 loan, U.S.N.M. ½ natural size.

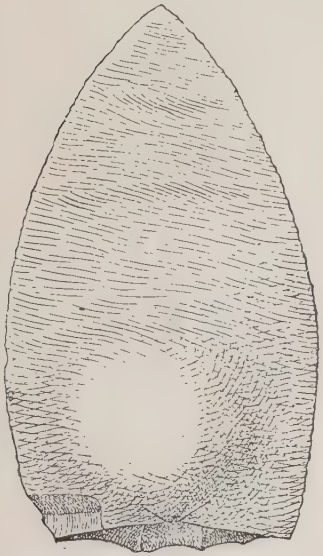
MOUSTERIEN EPOCH (CAVERN PERIOD).

In the subdivision of the Cavern period the earliest epoch has been called Mousterien from the cavern of Le Moustier (Plate 6). The peculiar art of this epoch and that which caused the subdivision are the points (Plate 7) and scrapers (Plate 8) found in such numbers, especially in this cavern. These specimens may not be the highest art, yet they are interesting from an artistic point of view no less than from an anthropological, for they are the first improvement in flint chipping, the earliest art learned by man. It is a step in the evolution of that art, and will be followed by another step in the next succeeding epoch. These points are the earliest analogous to spearheads, made or used by man, and undoubtedly the ancestor or forerunner of all arrow or spear heads.

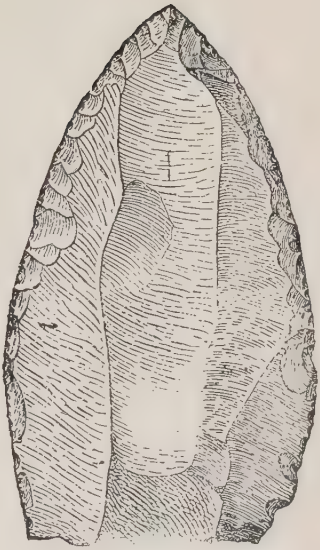
The Mousterien scraper was the earliest implement of its kind made by man. These, as well as the Mousterien points just described, were made usually of flint, and by chipping. These specimens are additionally interesting as the first step taken by man in the art of tanning and as being the oldest specialized tool or utensil known to him.

The flint chipping peculiar to this epoch, shown by these specimens, is that one side of both utensils is left smooth as when struck from the nodule or nucleus by the blow that knocked off the flakes (Plates 7 and 8, fig. *a*). The back has been made shapely by smaller flakes, usually three in number, struck off longitudinally (Plates 7 and 8, fig. *b*). This is the very beginning of this art, and as we see how the operation became improved we will wonder at the adeptness with which it came to be performed.

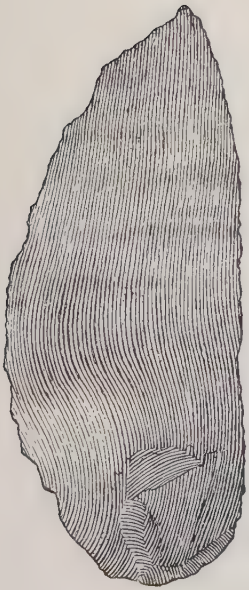
PERSPECTIVE VIEW OF THE CAVERN OF LE MOUSTIER, FROM THE VÉZÈRE.



a



b



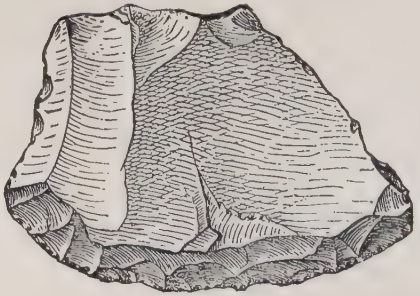
c

d

MOUSTERIEN POINTS (PALEOLITHIC), OBVERSE AND REVERSE.

Cat. No. 9015, U.S.N.M. Natural size.

a



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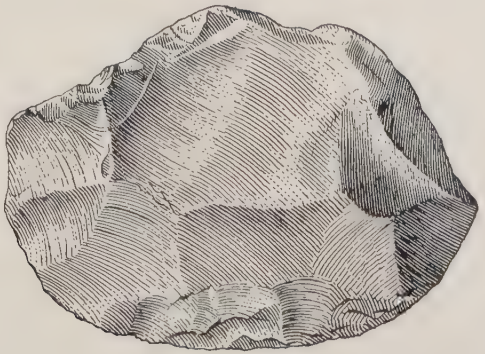

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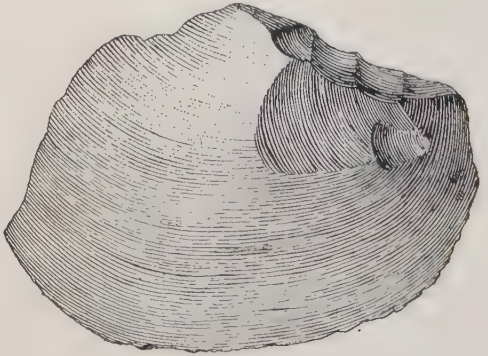


d

MOUSTERIEN SCRAPERS (PALEOLITHIC), OBVERSE AND REVERSE.

Cat. No. 99896, U.S.N.M. Natural size.

SERIES OF SOLUTRÉEN (PALEOLITHIC) LEAF-SHAPED BLADES.

Cast, Cat. No. 99747, U.S.N.M. ½ natural size.

a

b

d

c

NOTCHED OR BARBED SOLUTREEN (PALEOLITHIC) POINTS.

a, rudest form; *b*, form leaf-shaped; *c*, finest form, broken; *d*, finest form, restored.

SOLUTRÉEN EPOCH.

The art of flint chipping has never, in prehistoric times, nor among prehistoric or savage peoples, attained a higher degree of excellence than during the Solutréen epoch. There seems to have been an evolution from the rude and heavy Chelléen implement up to the fine Solutréen leaf-shaped blades. What time elapsed between the two we have no means of determining; it is to be counted by geologic epochs and not by years or centuries. There was a regular and steady improvement in the art of flint chipping, produced, apparently, by continued experiment and practice, the result of which must have been communicated or transmitted from father to son, from teacher to student, from master to apprentice, until the ideal flint chipping was attained in the Solutréen leaf-shaped blades (Plate 9). During this epoch the spear-heads of the Mousterien epoch became perfected in form, style, and delicacy of manufacture. They increased in length and decreased in thickness, until the standard implement took the shape of a laurel leaf and the name "leaf-shaped," which name has been perpetuated and extended to similar implements throughout all ages and countries. They will be shown in the chapter on America. The leaf-shaped spear-head was not only enlarged to the largest size, but it was diminished to the smallest, so as to assimilate them with the leaf-shaped arrowheads (Plate 9).

Fig. 16.

ROUND-ENDED SOLUTRÉEN (PALEOLITHIC) SCRAPER.

Cat. No. 99812, U.S.N.M. ½ natural size.

A further development was wrought by changing these implements so as to make a shoulder on one side (Plate 10), and herein it was probably the ancestor or precursor of the notched or shouldered arrow and spear head which traveled throughout both hemispheres while civilization was yet young, and long before history began.

The same kind of development was made in the scrapers, by which the scraping edge was changed from the side to the end (fig. 16), and this round-ended scraper has continued through all prehistoric times and among almost all savages in historic times who have used any such kind of implement. Practically the same utensil has been seen in the hands of untaught savages by men still living. The stone scraper of the Eskimos, used until the advent of the Russian on their shores, was not different in form, appearance, or manufacture, and probably not in use, from that which began in this epoch. The same utensil was prevalent among North American Indians as it was among all savages who used skins for dress or tent covering, and so had need to use the scraper. The *teshoa*, so named by Dr. Leidy, and used by the Indians on the eastern slope of the Rocky Mountains, is the principal, if not the only, exception. This was simply a round or oval spawl struck from a smooth quartzite or other hard bowlder, the scraping edge of the spawl making the edge of the tool. The United States National Museum possesses specimens of it. (Cat. Nos. 170602, 170667, and 11540, U.S.N.M.)

Engraving, Sculpture, and Painting.

MADELAINIEN EPOCH.

M. Lartet named this the Reindeer epoch because of the great number of remains of this animal found during his explorations in southern France. Plate 11 is a perspective view of the station of La Madelaine. It is a rock shelter, not being of sufficient depth to be called a cave or cavern. The rock overhangs, as is shown in the plate and as is still better shown in plate 12, of Laugerie Basse. The base of the cliff was eroded by the stream and the projection afforded shelter for its human occupant. The author spent some time in this station, and found it, contrary to the condition of the other stations, far from being exhausted. Its owner prohibits further excavation by the public, and requires everything to be done under his own supervision and with his special permission. The station extends many yards along the foot of the cliff. We were much surprised, on digging through the earth, which appears to have washed in and filled up the mouth of the shelter, to find a deposit 8 or 10 feet deep of flint flakes or blades, more or less broken. Their principal value was in showing the extent of human occupation, either by a great number of people or for a long period of time, or perhaps both. After all the excavations made by Lartet in 1862–63 and by his followers in the twenty succeeding years, these flint pieces were found by us in such numbers that they rattled under the stroke of the pick or mattock as though we had been digging in a dump heap of broken pottery.

Fig. 17.

FLINT SCRAPER WITH ROUNDED END (PALEOLITHIC).

La Madelaine (Dordogne), France.

Lartet and Christy. ½ natural size.

Fig. 18.

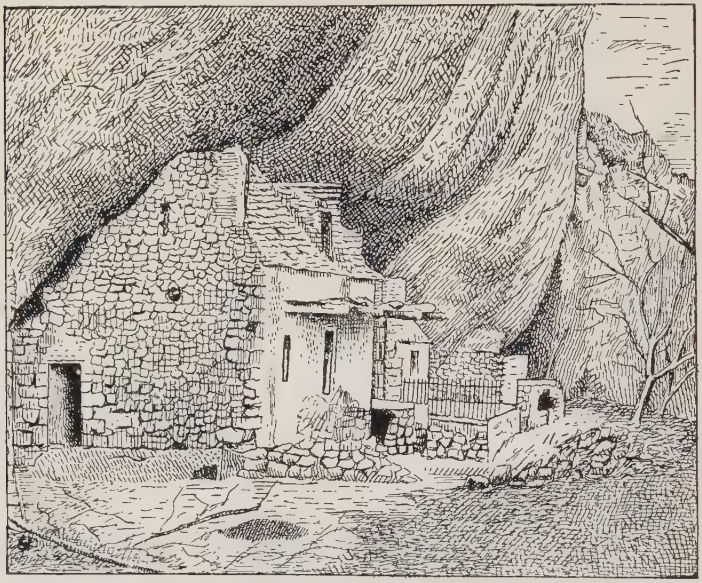
FLINT FLAKE (PALEOLITHIC), PROBABLY A SAW OR KNIFE.

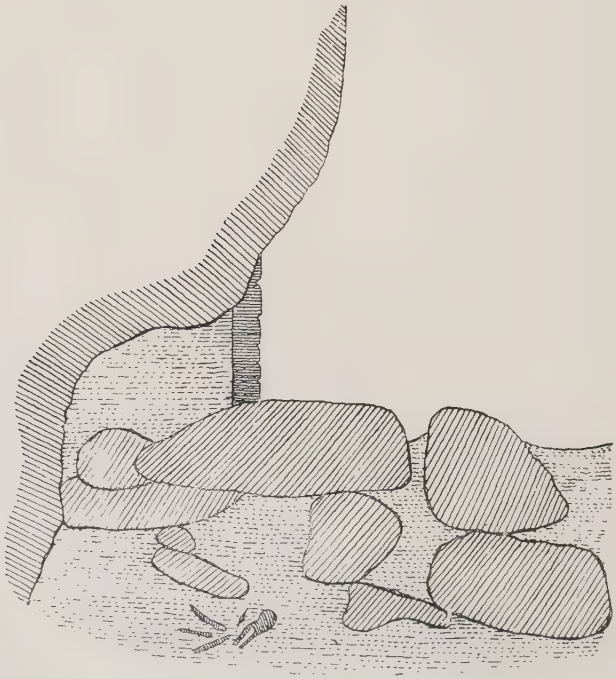
La Madelaine (Dordogne), France.

Lartet and Christy. ½ natural size.

Cro-Magnon.—Cro-Magnon is on the west side of the River Vézère, at the railway station of Les Eyzies, 16 miles south of Perigueux. The prehistoric station occupied very nearly the site of the present house. The station has been entirely excavated and destroyed. Here was found the celebrated human skull which has given its name to the prehistoric race of Cro-Magnon. These caves and shelters having been the habitations of prehistoric man, they

ROCK SHELTER OF LA MADELAINE, RIVER VÉZÈRE, DORDOGNE.





PERSPECTIVE VIEW AND SECTION OF THE ROCK SHELTER OF LAUGERIE BASSE, RIVER VÉZÈRE, DORDOGNE.

contain the broken or lost objects of his industry and specimens of his art. (See Plate 1.)

The culture of La Madelaine was similar to that of Laugerie Basse (See map, Plate 5), but Laugerie Haute had a somewhat different culture, and this caused La Madelaine to be chosen as the representative and to have given its name to the epoch.

Laugerie Basse.—Plate 12 is a perspective view and section of the rock shelter of Laugerie Basse. Many objects of prehistoric human industry and art have been found in it. It was undoubtedly occupied for a long period of time. The house shown was located on or over the entrance to the cavern, which, however, had previously been filled with fallen rocks and earth. The entrance for excavation of the cavern was through the house and under its floor. The principal work of excavation was done by M. Massenat, of Mailmont, near Brives (Correze). The overhanging rock, projecting about 45 feet, afforded the shelter. This precipice of rock extended with intervals for several miles up and down the river, with many other occupied caverns and rock shelters, which showed a dense population or long-continued occupation, or both.

a *b*

Fig. 19.
FLINT POINTS OR DRILLS.
La Madelaine (Dordogne), France.
Lartet and Christy. Natural size.

Despite the employment of horn and bone, flint continued to a large extent to be used for implements. The scraper of the Mousterien epoch had its edge on the side, while in the Madelainien epoch the scraping edge had changed to the end (fig. 17), and this form continued into historic times. Flint flakes abounded during this epoch, some large, long, and thin, with sharp edges, probably used for knives (fig. 18); others small and fine, with delicately wrought corners and points (fig. 19 *a*, *b*), probably intended for drills.

Here we leave paleolithic flint chipping, and because the man of this epoch turned his attention to other manifestations of art, we have to follow him. The subject will receive further attention in the chapter on the Neolithic period.

Engravings on Bone, Horn, and Ivory.

This epoch is most important in the history of art, marking as it does the earliest human expression of the beautiful, of art for art's sake. It has been said that this expression marks the first step in evolution from savagery. If so, this step was first taken during this epoch and in this locality, for here prehistoric art of the Paleolithic period made its first manifestation and attained its highest grade.

The art of this locality was indigenous. It was not an imitation, and it seems not to have been borrowed nor to have migrated. It appears to have been a manifestation of the natural art tendencies of the human mind.[1] It consisted sometimes of sculpture done in the round;

[1] See Introduction, p. 302.

sometimes of etchings or engravings on stone, bone, or horn. If on wood, such specimens have decayed or been otherwise lost. Bone, horn, and ivory became known during this epoch, and were now first employed by man for æsthetic and decorative purposes as well as for utility.

Judge E. Piette, one of the most ardent and persistent explorers of the prehistoric stations of France, confining his investigations largely to the grottoes, caverns, and rock shelters belonging to the Paleolithic period, having spent twenty-five years in this pursuit, has made discoveries and formulated theories with regard to the arts and industries of the early prehistoric man in that country that are entitled to serious consideration.

He awards the fullest credit to the investigations of Lartet and Christy, of Vibraye, Franchet, Garrigou, and others. He admits the discovery of three types of human industry as found in the caverns of Le Moustier, Laugerie Haute, and Madelaine, and eulogizes De Mortillet for his creation of the Archeo-Ethnologic science, or as De Mortillet himself puts it, Palethnology.

Judge Piette concedes the importance of the discoveries and studies of these leaders, and joins their followers, now comprising all the students of the science in France and nearly all in Europe, and the rest of the world, in the belief now universally accepted that man occupied western Europe contemporaneously with the great mammals of the prior geologic epoch, now extinct, such as the three species of elephant, the cave bear, Irish elk, and *Rhinoceros merckii* and *tichorinus*.

The early explorers were so elated with the discovery of the many evidences of this early existence of man that they were apparently content to note only the differences in the objects of his art and industry found in the different caverns. Judge Piette pushed his investigations another step and sought to discover stratigraphic differences in every cavern explored. In this task he has been eminently successful, and has traced through the various strata of the different caverns the origin of human art and industry, its evolution, apogee, transformations, decline, and sometimes its disappearance. Out of all this he has, while adhering generally to the classification of De Mortillet, made some changes and given new names. He doubts if the origin of man or his first appearance as man is accounted for in De Mortillet's classification. So he gives to his earliest term the name of "*passage*," associating man with the *Elephas antiquus*, *E. meridionalis*, *E. primigenius*, and a pliocene fauna. His Chelléen epoch has the same fauna, with a predominance of *Elephas antiquus*, and all this he declares to have been preglacial.

His next grand division includes the Glacial epoch with the divisions of Mousterien, wherein man was associated with the *Elephas primigenius*, *Rhinoceros tichorhinus* and *Ursus spelæus*. This comprises the art and industry of the same epoch in de Mortillet's classification.

Piette's classification here differs from de Mortillet's, he inclining to use the names of animals and of industries rather than of localities, so instead of Solutréen and Madelainien he calls them Equidian, Tarandian or Cervidian, and Hippiquian. But so far as these epochs relate to art he denominates the entire period as "Glyptique," and divides them, beginning with the earliest, according to their respective strata as found by him in the caverns, as follows: (1) Sculptures in the round; (2) sculpture in bas-relief; (3) engravings, *champlevé* and simple, needles, harpoons of reindeer and deer horn. This closes his period "Glyptique," and takes him into the epoch of transition at the close of the Glacial period. In the latter part the ancient animals have become extinct and are replaced by the modern fauna. His next subdivision, still in the Paleolithic period, he calls "Asylien," from the Grotte Mas d'Azil, the peculiar art product of which was the colored pebbles to be described in the paragraph on painting. During this last division of the period of transition the glaciers had disappeared, the climate had changed, and the reindeer and other cold-loving animals had departed. The classification of Judge Piette subsequent to this, though changed somewhat in form and name, is substantially the Neolithic or polished-stone age, the age of bronze, and the first age of iron, as now recognized by prehistoric archæologists.

Judge Piette says that the remains of *Equus* predominate in the lower strata in the caverns, while the remains of *Cervus* predominate in the upper strata or those next above; and for this reason he makes two principal divisions of his period Glyptique—Equidian and Cervidian. He draws from these facts the conclusion that there was a change in the food of man. During the earlier period he used more horse meat, which accounts for the larger number of bones; while in the later period he used a greater amount of deer meat, which accounts for the greater number of the bones of reindeer, deer, etc. From these circumstances and those growing out of them he speculates upon a change of climate. Horses, it is said, would only live in a moderately cold climate on plains producing grass and similar food. The reindeer, on the other hand, prefer dry and cold food, as moss and lichens, and they will thrive and increase in a climate where horses would perish. Piette certifies to the fact that the replacing of the horse by the reindeer is more complete in the caverns in the mountains than in those in the valleys and on the plains. One point made by Judge Piette is that much the largest number of sculptures in the round (which forms his first division) were in ivory, while the greatest number of engravings and other specimens of the Glyptique art were on horse bone and reindeer horn. This, curiously enough, is the order in which the animals furnishing the respective materials are agreed to have lived in that country—first the elephant tribe, mammoth, etc., then the horse, and lastly the reindeer.

It is not intended by the author to follow in this paper Judge Piette's

classification. It may be more correct than any other, but that has to do with archæology rather than with art, and so its consideration need not be here continued. Nor is it intended, in presenting specimens of art, to attempt any chronologic order of their appearance, nor to separate them into schools or classes. This may be done in the future, but the science of Prehistoric Anthropology is not sufficiently advanced to enable it to be done now with assurance of success. The prime fact with which we have to deal is that these specimens were made by man at a period of high antiquity, and that they show an unwonted ability in primitive art. We have here art for art's sake. Artists and art critics may theorize as to its origin, but here we have the hard fact.

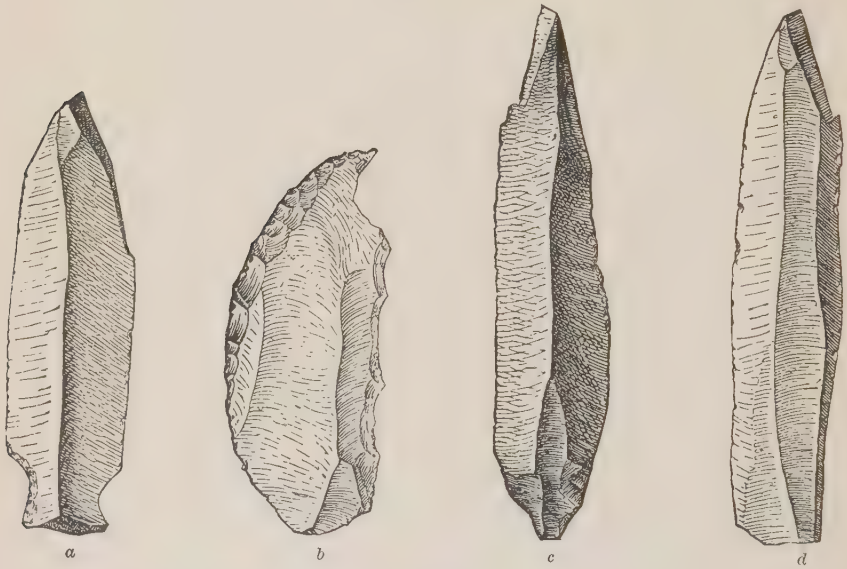


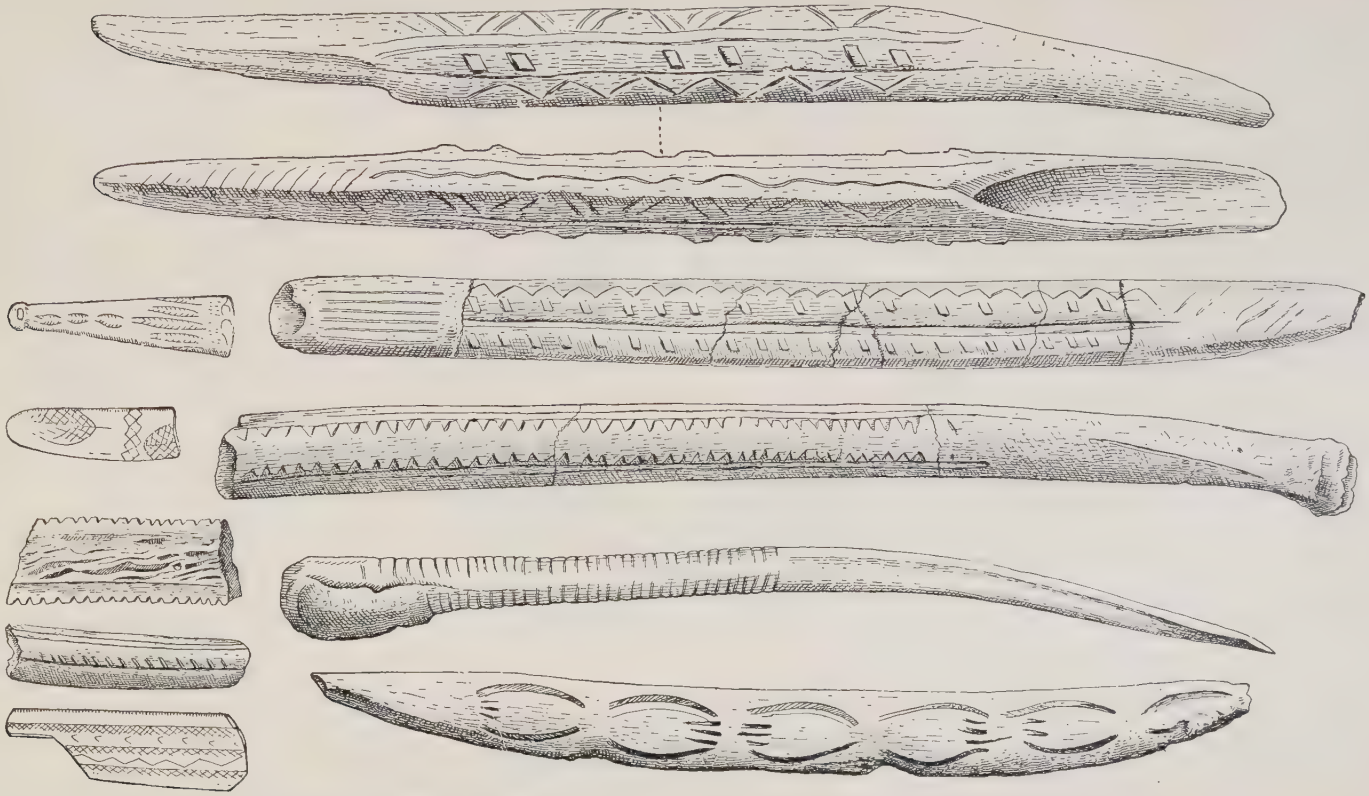
Fig. 20.

FLINT GRAVERS.

La Madelaine (Dordogne), France.

Lartet and Christy. ⅔ natural size.

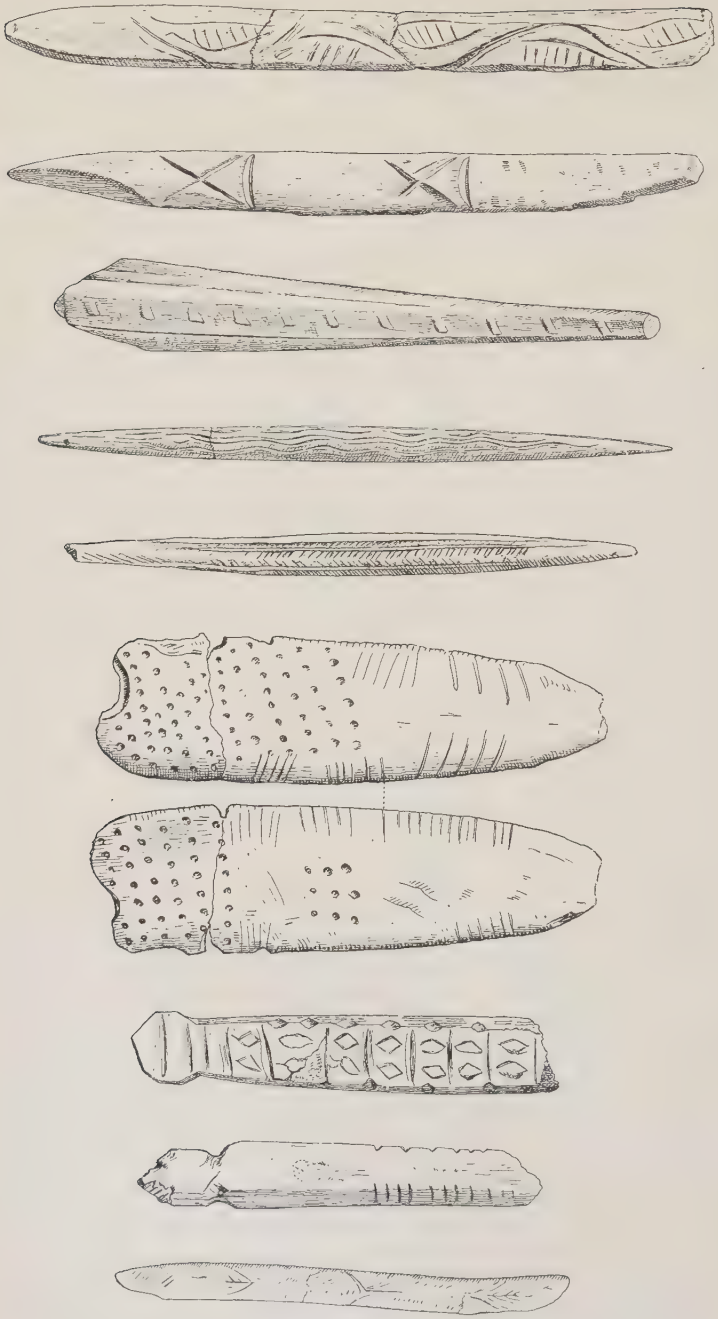
The most wonderful exhibition of art in this epoch was in the representation of animal life. Sometimes the animals are at rest, but many times they are in action. Hunting scenes are depicted in which the hunter, a man, is shown in pursuit of his game and in active conflict with it. In one a man is throwing a spear; in another the serpent bites his heel; deer are shown in action; the reindeer with his nose high in the air and horns thrown on his back; a reindeer browsing and representing a veritable landscape with perspective drawing. The engraving and sculpture represent the mammoth, the reindeer, horse, bison, musk ox, birds, fish, serpent, and others. Some of these are arctic animals now found only in cold countries, others are extinct. A mammoth was engraved on a plaque of ivory (part of his own tusk), a



DECORATIVE GEOMETRIC AND CONVENTIONAL DESIGNS OF THE PALEOLITHIC PERIOD IN EUROPE.

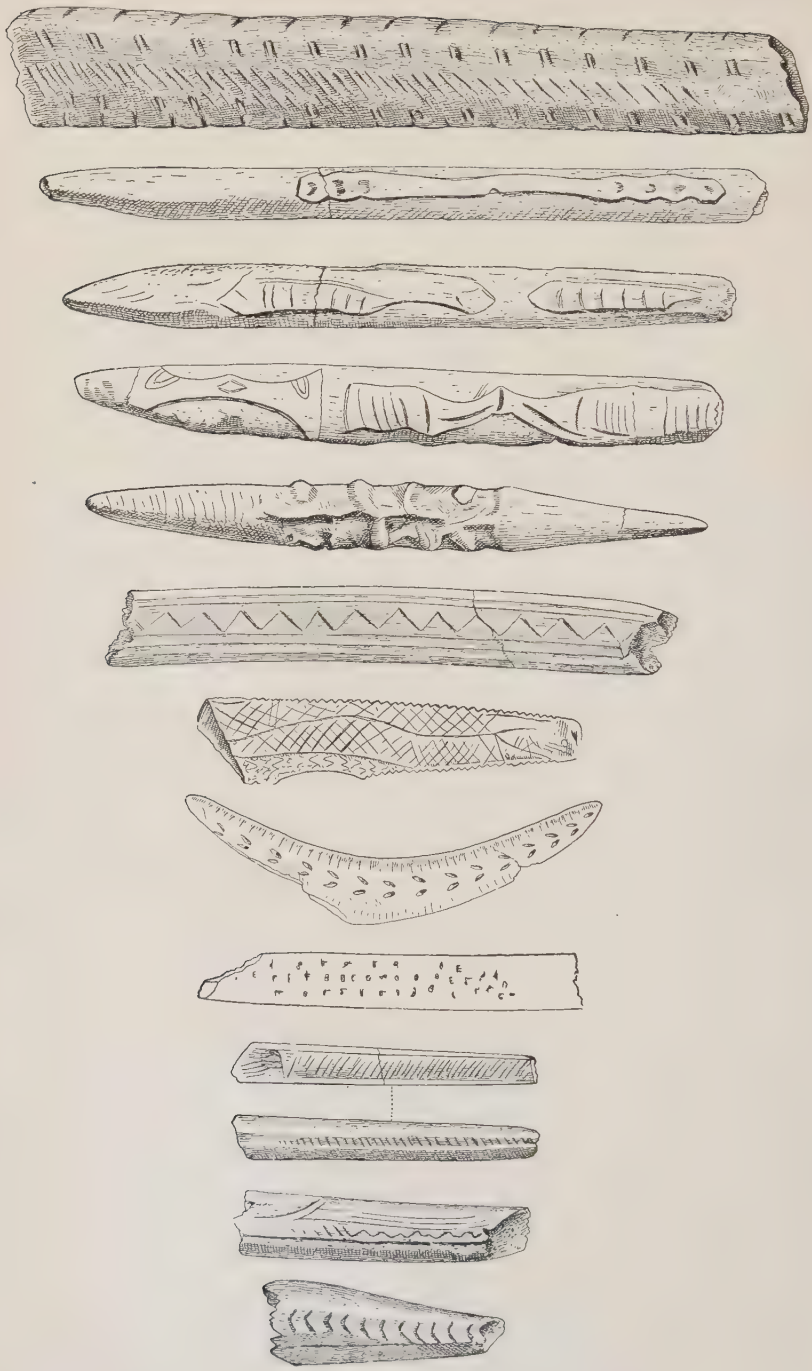
⅔ natural size.

Report of U. S. National Museum, 1896.—Wilson.



DECORATIVE GEOMETRIC AND CONVENTIONAL DESIGNS OF THE PALEOLITHIC PERIOD IN EUROPE.

$\frac{2}{3}$ natural size.



DECORATIVE GEOMETRIC AND CONVENTIONAL DESIGNS OF THE PALEOLITHIC PERIOD IN EUROPE.

$\frac{2}{3}$ natural size.

cave bear was engraved on a pebble of schist, a poniard was made of reindeer horn, the handle being in the form of the reindeer himself. These all came from southern France, and are evidence of the existence of these animals in that locality, for the artist must have seen them before he could depict them. They are the first known drawings from life.

Gravers.—Fig. 20, *a*, *b*, *c*, *d*, represents gravers of flint. These gravers are not dressed to a sharp point from all sides, but have a V-shaped point, as does the graver's tool of to-day. We have many of the originals in the National Museum, of which some are quite worn, while others are sharp and could be now used to engrave the bones as in prehistoric times.

The implements and utensils of everyday use were decorated with an art by no means contemptible. The ornamentation of harpoons, daggers, and similar objects shows an appreciation of decorative art as applied to household or domestic uses not unworthy of the nineteenth century. These constitute the first or elementary series. The designs are geometric, and made by dots or lines arranged with greater or less regularity, straight, curved, or broken. The figures are formed in festoons, zigzags, hatched work, but more frequently in chevrons. With the employment of almost every kind of geometric design, forming elaborate combinations, we have to remark that the more simple—notably circles, crosses, or triangles—were not employed. (Plates 13, 14, 15.)

Fig. 21.
HARPOONS OF REINDEER HORN.
La Madelaine (Dordogne), France.
Lartet and Christy. ⅔ natural size.

Harpoons.—The art work on harpoons exhibits considerable artistic ability as well as manual dexterity (fig. 21, *a*, *b*, *c*, *d*). The art work of these is displayed in the purity of the drawing, in the straightness of the lines, in the symmetry of the design, and in the general accuracy and truth with which it has all been executed. The main shaft of

the harpoon is straight from one end to the other, while the barbs are symmetrically placed; whether opposite or alternated, their spaces are equal, they have the same form, and point in the same direction.

Animals.—The animals of this epoch were represented in great numbers, about three hundred specimens having been discovered, comprising nearly every animal known. There are some reptiles, more fish, a few birds, and many mammals. The reptiles are scarcely determinable. Of the fish, the salmon, the trout, and the brochet have been recognized. A swan was found at Laugerie Basse. There is a fair representation of what is probably the entire fauna of the epoch. The principal ones were the cave bear, mammoth, reindeer, horse, ox (two species, the urus and the aurochs), deer, mountain goat, antelope, chamois, wild boar, wolf, fox,

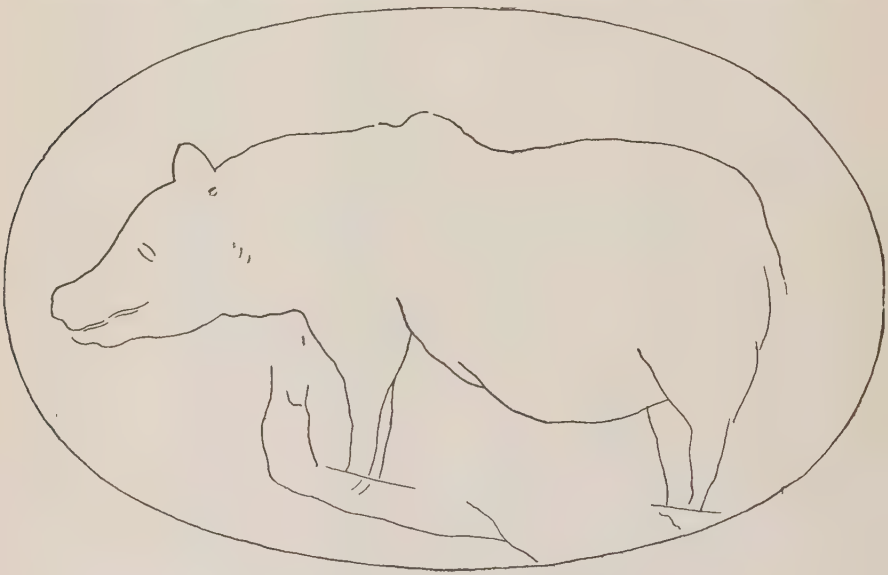


Fig. 22.

CAVE BEAR ENGRAVED ON A FLAT OVAL PEBBLE OF SCHIST.

Grotto of Massat, Ariege.

Original, Musée de Foix. Natural size.

bear, lynx, otter, seal, walrus, and rabbit. There are a few representations of animals as yet unrecognized. One is the small animal resembling a cat, engraved on both sides of the bone disk (fig. 58). To this list of animals, of course, man must be added.

The cave bear.—Fig. 22 is an engraving on a flat stone or water-worn pebble of schist, about 6 by 4 by 1 inches, found by Dr. Garrigou in the Grotto of Massat (Ariege), a few miles south of Toulouse. The original is in the prehistoric museum in Foix, where the author saw it. The characteristics of the animal are well represented; one can see its prominent forehead, the irregular line of its back, immense body, short and heavy legs. It is identified as the *Ursus spelæus*, or great cave bear, which occupied that country in numbers during the Quaternary geologic period. It is extinct and has been during all historic time.

Its existence is only known from the finding of its fossil bones (fifty-seven individuals were found in the neighboring Grotto of l'Herm), and from this the only pictorial representation of it ever made from life. The engraving bears its own evidence of genuine antiquity. It shows a certain degree of art and will compare favorably in point of execution with the average representation in outline of such an animal in our natural history school-books. The correctness of the drawing seems to be indisputable, for it corresponds exactly with the fossil skeletons of the animal. The United States National Museum possesses a skeleton of one of these animals in Anthropological Hall (Cat. No. 172850).

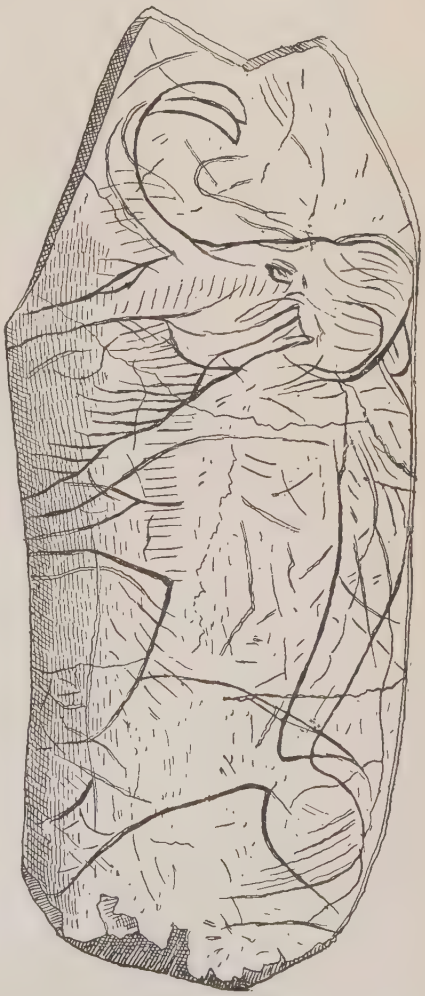


Fig. 23.

ENGRAVING OF MAMMOTH ON A FRAGMENT OF HIS OWN TUSK.

La Madelaine, Dordogne.

Found by Lartet and Christy. Museum d'Histoire Naturell, Paris. Cast, Cat. No. 99736, U.S.N.M. ⅓ natural size.

Mammoth.—Fig. 23 represents a mammoth, *Elephas primigenius* (Blum.), engraved on a laminated fragment of his own tusk. It is a thin, oblong piece of ivory, convex on the side according to the cylinder of the tusk, and slightly concave longitudinally according to its curvature. It was found at La Madelaine by M. Lartet, and was described in "Compte Rendus de l' Academie des Sciences," 1865. The original is in the Museum of Natural History in Paris. The lofty skull, the bulging and curved forehead, the curved tusks and shaggy hair, identify it satisfactorily. There have been many skeletons of the mammoth found in various parts of the world, all fossil. That from the Arctic regions of Siberia, found by a Russian merchant, is well known. It was brought down, reconstructed, and is now exhibited in the museum at St. Petersburg. The sketch of that specimen, made by the traveler who discovered it, was not better made than is this one, done by the cave dweller of southern France. It is so well done that one must believe the artist had seen the animal, if he did not make the drawing from real life.

This paper has nothing to do with real mammoths, when or where existing. It deals only with artistic representations of the animal made by prehistoric man. Certain engravings of the mammoth have been found in the United States which are claimed to have been made by the aborigines. The author inserts them here, so that all pictures of this animal will be grouped together for comparison as works of art, and not at all with the contention that they belong to the same epoch, were made by the same people, or that they represent the same culture. The American specimens are inserted solely for convenience of comparison.

Mammoth (Lenape stone).—Plate 16 (fig. 1) shows the celebrated Lenape stone which has been described by, and received the approval of, Mr. Henry C. Mercer, Curator of American and Prehistoric Archæology, Museum of the University of Pennsylvania.

This paragraph has been submitted to Mr. Mercer with a request for his criticism. He wrote the following:

> Eleven years have passed, during which I have continually watched the subject. I have found no reason to doubt the genuineness of the Lenape stone. The specimen still in the possession of Col. H. D. Paxson is an isolated case that might well have deserved prolonged study on its merits.
>
> At a time when uncertainty prevailed as to human antiquity in North America, as to the late survival of certain Pleistocene animals like the tapir, sloth, peccary, castoröides, mastodon, and mammoth, and as to the true scope of Indian picture writing, this surprising document came to light suddenly near a center of archæological study.[1] Not marred by any patent flaw, or notoriously treacherous association, it seemed to invite active investigation from the outset. But the position of those then responsible for the welfare of archæology, who at little pains deposited an *onus probandi* on the shoulders of the witnesses for the stone and went on their way, has been negative from the first. To say again that they have not visited the locality, have not addressed themselves to the pros and cons, and have ignored three other carved stones found at the same locality, is to reiterate a conviction that they have slighted the subject.

It has been objected that, while the object itself was original, the design or engraving thereon was modern. Mr. Mercer still believes in the genuine aboriginal character of the engraving as well as of the object.

No argument is here made on this question, which belongs to archæology more than to art, but the author sees no reason to doubt the authenticity of the design or engraving, and it is presented as an example of aboriginal American art, representative of a mammoth or mastodon. Mr. Mercer wrote an elaborate description of the stone and its discovery, entitled "The Lenape Stone, or the Indian and the Mammoth," published in 1885, and the reader who desires to examine the details and arguments is respectfully referred thereto. The circumstances, so far as concerns us, are that the aboriginal implement of slate represented in plate 16 (fig. 1), of the form called gorget or perforated tablet, drilled and broken as shown, was found in the years

[1] Doylestown, Bucks County, Pennsylvania.

THE LENAPE STONE, A SLATE GORGET WITH FIGURE OF MAMMOTH OR MASTODON ENGRAVED THEREON.

Found by Bernard Hansell, near Doylestown, Bucks County, Pennsylvania.

Paxon collection. $\frac{3}{14}$ natural size.

FULGUR SHELL, WITH FIGURE OF MAMMOTH OR MASTODON ENGRAVED THEREON.

Found by M. Sarault at Hollyoak, Delaware.

Cat. No. 148313, U.S.N.M. Natural size.

1872 and 1881, being turned up by a farmer while plowing on his farm, 4½ miles east of Doylestown, Bucks County, Pennsylvania. The two pieces were found in the same spot, but at different times, with an interval of nine years between.

Mammoth (Dr. Cresson, Delaware).—Plate 16 (fig. 2) is another aboriginal drawing of a mammoth in America. It was found by Dr. H. T. Cresson and Mr. Saurault, in the neighborhood of Holly Oak Station, Wilmington and Baltimore Railroad, Delaware, on the surface of a tilled field which had been covered for manuring purposes with peat taken from what Dr. Cresson calls "the fallen forest layer in one of the adjoining estuaries of the Delaware River." The engraving represents a mammoth resembling somewhat that found at La Madelaine (fig. 23). It was engraved in much the same manner, and might

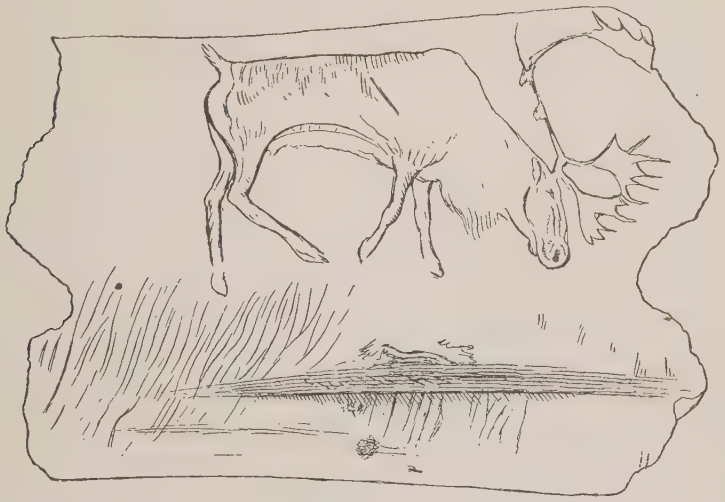


Fig. 24.

REINDEER BROWSING, ENGRAVED ON REINDEER ANTLER, BOTH SIDES REPRESENTED.

Grotto of Thayingen, near Lake Constance, Switzerland.

⅔ natural size.

have been done with the same kind of flint gravers. It is on a Fulgur shell, indigenous to America, and found on the coast from Delaware to Florida. The authenticity of this engraving has also been attacked. Dr. Cresson and Mr. Saurault are both deceased, and no other than the internal evidence presented by the object itself and the declaration of its finding as aforesaid can now be furnished. Without stopping to argue for the genuine aboriginal character of the engraving, it is only fair to say that the appearance of the object and of the engraving are indicative of antiquity, and that it presents no traces of modern work. There are no indications of its having been doctored or in any way tampered with, and, like the former disputed engraving, it is presented (subject to future discoveries) as a genuine example of aboriginal art.

The reindeer.—Fig. 24 represents a reindeer (*Rangifer tarandus*) brows-

ing. This specimen is from the cavern of Thayingen, near Lake Constance, Switzerland. It is engraved upon a piece of reindeer antler and possibly was the fragment of a *bâton de commandement*. The piece here represented is, taken in its entirety, probably the best art picture yet found belonging to the Paleolithic period. The one view shown represents both sides of the antler, as though it had been unrolled. Spread out thus, it has the appearance of a veritable landscape with water in the foreground, herbage around it, and the grass, etc., in the background where the reindeer is feeding. This specimen is engraved two-thirds natural size. The size and outline of the body with development of the antlers denote a full grown male. The peculiar the pinched form of the belly, apparently exaggerated by the artist, is common after the rutting season. The head, horns, and body lines are true and correct. The eye is of the proper form and is rightly placed. The attitude of the animal indicates him to be walking slowly, browsing or grazing as he goes.

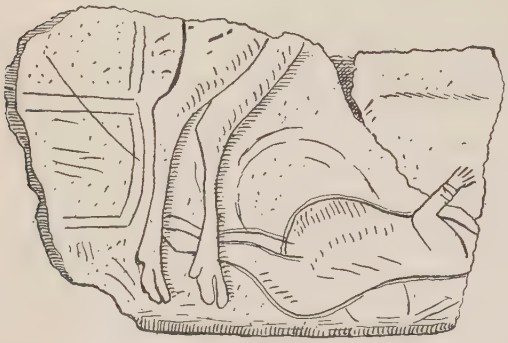


Fig. 25.

REINDEER (HIND LEGS) AND BODY OF A WOMAN, ENGRAVED ON A FRAGMENT OF SHOULDER BLADE. REVERSE, RUDE SKETCH OF HORSE.

Found by Landesque at Laugerie Basse, Dordogne.

Collection of Judge E. Piette. Cast, Cat. No. 99741, U.S.N.M. $^2/_3$ natural size.

Fig. 25 is an illustration (of which others will be shown) of the use of a piece of material to repeat different objects or views, sometimes each from a different point of view, and one overlaying the other. This is a fragment of shoulder blade. It represents a woman's form which has been engraved, and over it afterwards a reindeer of which the two hind legs only remain. This specimen was found at Laugerie Basse and belongs to the collection of Judge Piette. The woman has a collar about her neck and bracelets upon her arms. There are marks said to represent hair, but which may be only the effort of the artist to represent the rounded appearance of the human form instead of presenting it in profile. The foregoing specimens are particularly fine art work. They illustrate the proposition emphasized and repeated

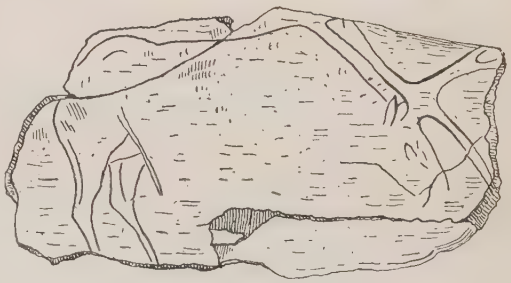


Fig. 26.

REINDEER WITH JAVELIN IN HIS FLANK, ENGRAVED ON THE RIB BONE OF OX.

Found by E. Douliot, Grotto of Carnac, Dordogne.

Musée St. Germain. Natural size.

throughout this chapter, of the natural desire of man in his original state of savagery to enjoy and possess objects which to him were beautiful, and that he was thus prompted to make them in his chosen style of beauty. These specimens represent art for art's sake. In them savage man was at play with art, and apparently for the sole purpose of gratifying his natural taste for beauty—to satisfy his natural desire for beautiful things. And the same is true of many other specimens. There is no pretense of utility in these. They indicate the use by aboriginal man of such materials as he had within reach to make objects the beauty of which would give him pleasure. This was equally true whether the objects, as harpoons, bone points, spears, batons, were for use or were, like the foregoing, only pictures to be hung on the wall.

Fig. 26 represents an engraving on several fragments of the rib of an ox or bison. These fragments were found in the Grotto of Corgnac, Dordogne, and being joined together, were found to fit and to represent a reindeer with a javelin or arrow in his right flank or hip. It was collected by E. Douliot and is in the Musée St. Germain. It has the same pinched appearance of the belly as noticed in the Thayingen specimen. Although imperfect and incomplete, it shows with a few strokes and in no uncertain manner the characteristics of the animal.

Fig. 27.

REINDEER (?) ENGRAVED ON ONE OF THEIR OWN METATARSALS.

La Madelaine. Lartet and Christy.

British Museum. Cast, Cat. No. 8144, U.S.N.M. Natural size.

Fig. 27 is an engraving made upon a fragment of the metatarsal of a reindeer, showing parts only of two animals. The principal one is in view and has been taken for a reindeer. This has been decided by the general outline, the form of the shoulder, and the tuft of hair characteristic of the male reindeer, which appears on the brisket. In front of the ear is an indication of antlers, a slender horn without brow antler, which would indicate a young animal. The hatchings or hair markings on different parts of the body indicate the projections of either bone or muscle. There are imperfections to be noted about the head, if a reindeer was intended to be represented. Though well set on, the head is short, the angle of the lower lip, compared with the chin, is too salient, the nose is dilated as it is not in the reindeer and the eyes are immoderately large.

The horse.—The bones of the horse have been found in some of these caverns in great profusion, and it would appear that this animal spread generally over western Europe in Paleolithic times. Fossil bones have been found which belonged to other varieties of the horse, now extinct.

Whether they were ancestors of the horse or not, as is said by Prof. Edward D. Cope in his celebrated "Phenacodus Primœvis," has never been satisfactorily determined. There has been found, in the Grotto of Thayingen in Switzerland, near Lake Constance, an engraved bone (fig. 28) representing an animal of the horse kind, but different from any known variety. It may have been a horse, the drawing of which owes its peculiarity to the inability of the artist, but one can hardly think so, for, while in form, shape, and general appearance this might be, yet he could hardly have so misrepresented the tail. It is, however, remarkable that in all those peculiarities wherein it differs from the horse it should be found to correspond with the anoplotherium, an animal belonging to the Upper Miocene and reported by Prof. W. Boyd Dawkins[1] as having been found in western Europe. There is a similarity between them which, to say the least, is remarkable. Fig. 29 represents a horse on a fragment scarcely more than an inch long. It was found at Bruniquel, and the original is in the British Museum. Horses were frequently represented. They are all peculiar, but the peculiarities are reproduced in every engraving. Their heads are large beyond the proportions of the modern horse; they have hog manes bristling upright; the tail is thin and small, and stands out nearly straight. These were attributed to the peculiarities of the artist rather than to the horse, but since the discovery and reconstruction of the skeleton, notably that by M. E. Chantre in the Zoologic Museum in Lyons, these peculiarities are found to belong to the animal and to justify the fidelity of the artist. Fig. 30 represents one of the prehistoric pony horses, with large head, carried low, big muzzle, straight back, rat tail. It is on one of the engraved bones from Dordogne of which we have seen so many.

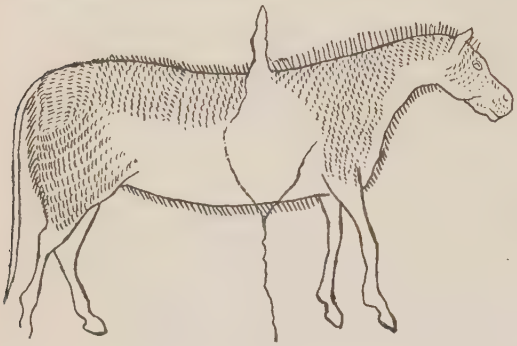


Fig. 28.

AN ANIMAL OF THE HORSE SPECIES, ENGRAVED ON BONE.
Grotto of Thayingen, Switzerland.
Collection, Piette.

Fig. 29.

HORSE ENGRAVED ON BONE.
Cavern of Bruniquel (Tarn-et-Garonne), France.
British Museum. Natural size.

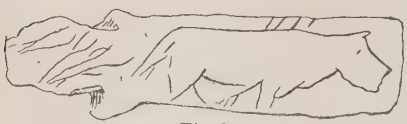


Fig. 30.

PONY HORSE.
From one of the Dordogne caves.
½ natural size.

Bâtons de commandement.—These are of stag or reindeer horn, with

[1] Early Man in Britain, p. 33.

one or more holes drilled through the center, transversely. On the beam of specimen, fig. 31, *a*, *b*, is an engraving of a string of four horses following each other. The specimen comes from La Madelaine

Fig. 31.

Bâton de commandement (*a*, obverse; *b*, reverse). A SHED REINDEER ANTLER, ONE HOLE DRILLED, DROVES OF HORSES FOLLOWING, THREE ON ONE SIDE, FOUR ON THE OTHER.

La Madelaine, Dordogne.

Lartet and Christy. Musée St. Germain. Cast, Cat. No. 8133, U.S.N.M. ⅓ natural size.

and was found by Lartet. This figure shows two sides, obverse and reverse, of the same implement. It is the shed antler of a reindeer. The first tine has been cut off apparently with a flint knife or saw;

three horses have been engraved on one side, four on the other. The horn is of such conformation as to afford a grip at the lower or heavy end, like a pistol grip, while the hole is so placed as to permit the insertion of the index finger. It is evident from inspection that this hole was bored subsequent to the engraving of the horses, for it passes through and cuts off the head of one horse on one side and of two horses on the other. Fig. 32 is a representation of a fragment of a similar bone with a horse engraved thereon and a hole bored, likewise after the engraving. Fig. 33 represents the shed antlers of a young reindeer from La Madelaine, showing the amputation of three tines, and with four holes. The holes in this, contrary to the former and many others, have either been bored before the decoration, or it was designed in advance for them. The stem or beam has been cut away laterally on each side so as to make a flat surface for the boring of the holes. The top or concave side bears thirty-three transverse notches or cuts, mostly equidistant, though some are arranged in pairs.

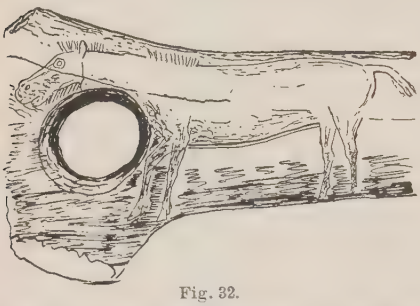


Fig. 32.

HORSE ENGRAVED ON FRAGMENT OF REINDEER ANTLER, WITH HOLE BORED AFTER DECORATION.

⅓ natural size.

A number of these implements have been found in the Paleolithic caves of western Europe. Their use is unknown and they are so peculiar that nothing should be omitted which will serve for their elucidation. Various uses have been suggested for them, as splitting soft wood, barking trees, or as weapons for game and for war. It has been suggested that they were to be held aloft in battles in the hands of the chief like an imperial standard, and so they have been called in French "*bâtons de commandement*," but none of these uses have been proved. The last has attached itself to them as a name, but possibly only in default of a better. Other persons have considered them as mere weapons. M. Pigorini, director of the Kircheriano Museum in Rome, suggests they might have been used as bits for horses' bridles. Implements analogous and made also of reindeer horn are found among the Eskimos and are said to have been used principally to kill game when near enough to be struck with it in the hand. Some travelers have given to them the name of "slave killers," from their alleged use by the Eskimos.

Lartet noticed in his early explorations that they were lacking "in the more ancient caves or stations which were characterized by the presence of lanceolate (leaf shaped) implements and by older fauna." He remarks[1] their absence in the stations Aurignac (Haute Garonne), La Chaise (Charente), Des Fées (Allier), and Gorge d'Enfer. On the contrary, in stations having the barbed bone harpoons, these batons

[1] Reliquiæ Aquitanicæ, p. 102.

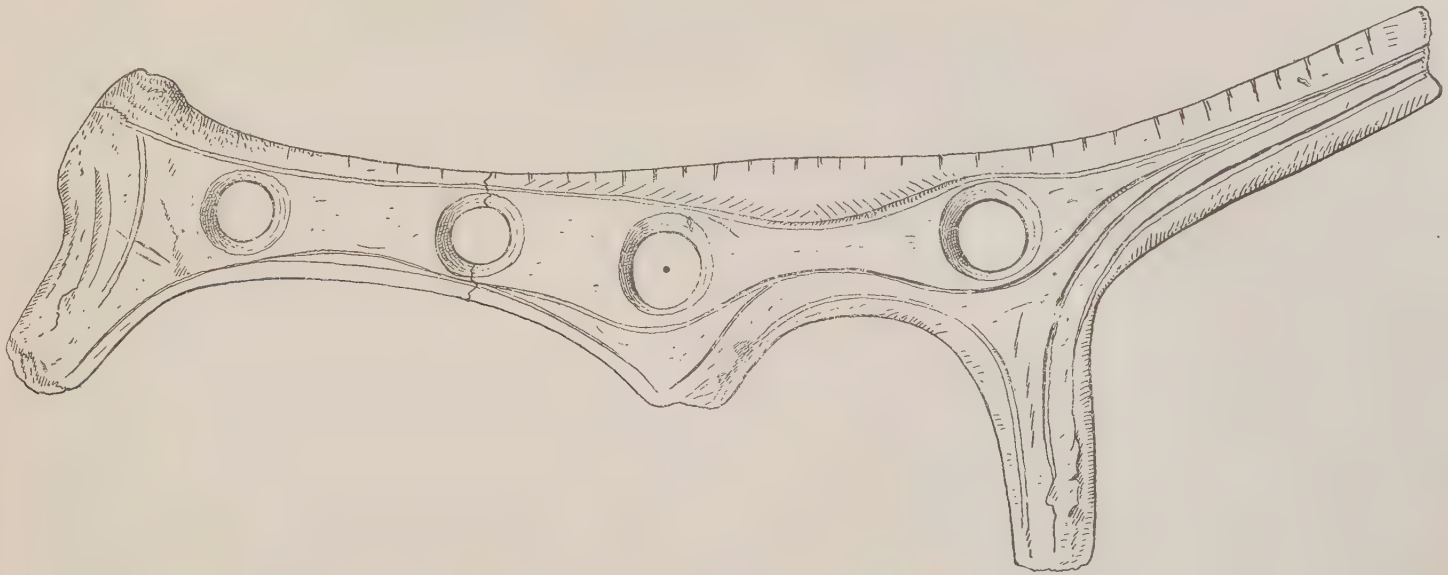


Fig. 33.

Bâton de commandement, WITH FOUR HOLES, BORED BEFORE DECORATION. MADE OF THE SHED ANTLER OF A YOUNG REINDEER.

La Madelaine, Dordogne.

Lartet and Christy. Cast, Cat. No. 8135, U.S.N.M. ¾ natural size.

were found, and he mentions the rock shelters of Bruniquel (Tarn et Garonne), Le Chaffant (Vienne), and the caverns of Massat (Ariege), Les Eyzies (Dordogne), Mont Saléve (Geneva, Switzerland), and Schussenried (Wurtemburg), as having them.

Fig. 34.

Bâton de commandement, WITH ONE HOLE, OF REINDEER HORN, ENGRAVED WITH EELS AND FISHES. OBVERSE AND REVERSE.

Grotto of Montgaudier.

Found by MM. Paignon and Gaudry. Musée d'Histoire Naturelle, Paris. ½ natural size.

Fig. 34 is an important and interesting specimen of these *bâtons de commandement* of reindeer horn. The two figures represent the opposite sides of the same piece. They are, however, turned end for end, and were discovered in 1886 in the Grotto of Montgaudier, not far from Angouleme, in the valley of the River Tardoire (Charente), near the western coast of France, by M. Paignou, who worked in company with M. Albert Gaudry. The archæologic stratum contained another engraved bone, bone needles, polishers, an ivory point, scrapers, and a magnificent Solutréen leaf-shaped blade.

M. Gaudry, the eminent paleontologist of the Museum of Natural History, Paris, received this *bâton de commandement* and it is now displayed in the museum. He made an extended description of the object before the Academy of France in July, 1886. In November he continued the account of his excavations in this grotto, and reported what he found in the lower strata—specimens of bones of the *Rhinoceros tichorhinus*, corresponding to and contemporaneous with the Mousterien epoch. Below this *bâton de commandement*, in the same stratum and associated with it, were bone points and a barbed harpoon, so M. Gaudry concludes that the stratum containing this baton was subsequent to the epoch of Moustier and contemporaneous with the cavern of Chauffaud, in the same neighborhood. He says of this specimen:

It is made of reindeer horn and is pierced with a large hole at the end. It is covered with engravings which show the certainty of the artist's mind and the sentiment of

Fig. 35.

Bâtons de commandement (?) OF REINDEER HORN FRAGMENTS, BORED, CARVED, AND DECORATED WITH ANIMAL AND GEOMETRIC DESIGNS.

Laugerie Basse.

Collection, Massenat. *a*. Cast, Cat. No. 136645, U.S.N.M. Natural size. *b*. Cast, Cat. No. 136640, U.S.N.M. ½ natural size. *c*. Natural size.

the forms which he depicts. The work is so fine that it requires the magnifying glass to bring out all its beauty. One face of the baton represents two seals, such as inhabited the sea off the coasts of France. One of them is seen in its entirety with his four members. The hinder members, so singularly carried among these animals, are exactly rendered, each foot having five toes. The size and extent of the tail is plainly to be seen. The head is delicately executed. The muzzle with its mustache, the mouth, the eyes, the hole for the ear, all indicate a degree of artistic ability. The other seal is not to be seen in its entirety; it is larger and has indications of long hair about its neck. The fore foot is exact. In front is a fish, which is either a salmon or a trout. Its spots are shown and the ventral fins are affixed to the abdomen.

On the opposite side of this baton are two animals, long and slim, the longer being 34 centimeters, or 13½ inches. They are not complete, but one shows its head and the other its tail. M. Gaudry thinks they represent eels, possibly serpents; *non constat*, but they may have been sea serpents. All these are represented on other specimens from various caverns and grottoes. Engravings of the seal have been found in the cavern of Varier (?), Haute Savoy, by M. Gosse, one in the Grotto of Gourdan, by Judge Piette; the salmon, or trout, in the cavern of Goye', Belgium, by M. Dupont; and the eel, or serpent, in Laugerie Haute, by Lartet and Christy.[1]

Implements have been found which, while similar in form, are in such fragmentary condition that one can not determine their function, but they persistently represent the hole bored as herein described. Some of these should be classed with sculptured rather than engraved objects, but cross reference should be made so that they may be studied in both classes. Fig. 35, *a*, *b*, *c*, shows three of these objects, all bifurcated, and of which *a* and *b* represent animal heads on the end of the bifurcation, while *c* represents a different decoration. The relation between these fragmentary implements, with their respective holes, and the former implements, *bâtons de commandement*, is as yet unknown.

The bison or ox (*urus or aurochs*).—Fig. 36 represents a man chasing an aurochs or bison. It is engraved on reindeer horn, comes from Laugerie Basse, was found by M. Massenat, and belongs to his collection. The man follows the bison and is in the act of throwing a spear or harpoon at him. Action on the part of both is shown, and the chase is well represented. It is an artistic representation of a prehistoric hunting scene. The position of the arms, especially the right, is awkward. The man has a sardonic grin. The marks, possibly representing hair, nearly cover his body. Whether they were really hair or were intended only to show light and shade and the rounded parts of the body has never been fully decided. M. de Mortillet believes them to represent hair and, therefore, that the man of this epoch was covered with hair. This piece furnished the basis for the reproduction of the man of the Cavern period displayed in the anthropological section of the Paris Exposition of 1889. (Plate 18*b*.) Fig. *a* of this plate represents the artists of the Chellèen epoch displayed at the same time and place.

[1] Materiaux, 1864, pp. 8–9, 73–74.

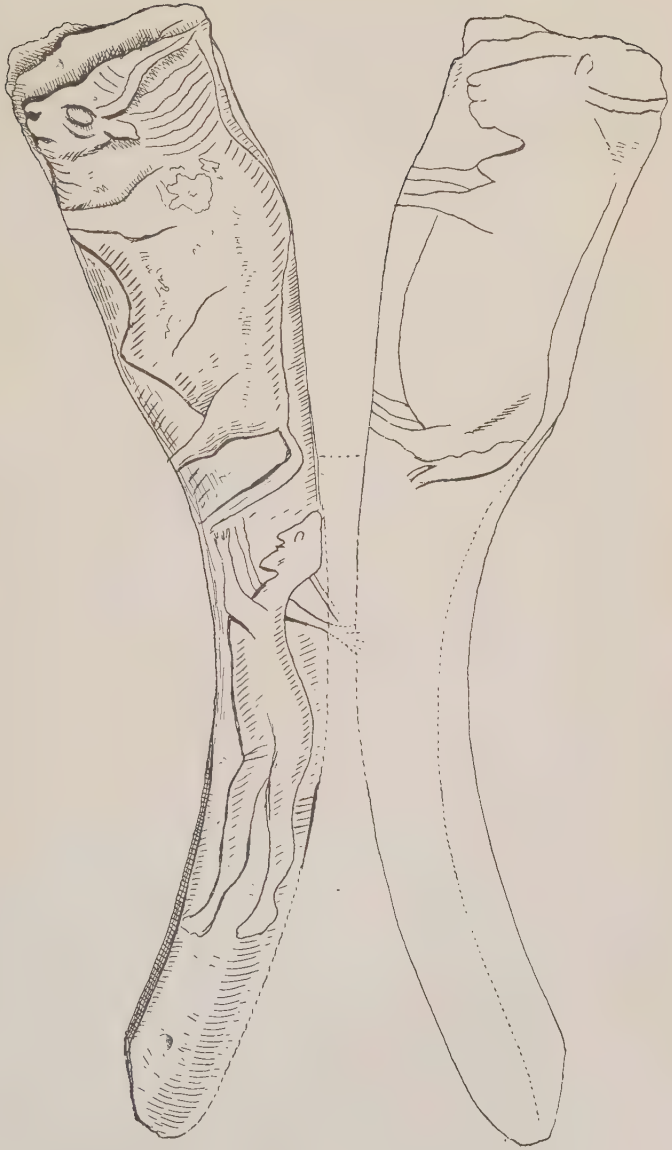


Fig. 36.

BISON AND MAN, ENGRAVED ON REINDEER ANTLER. HUNTING SCENE. OBVERSE AND REVERSE.

Laugerie Basse, Dordogne.

Collection, Museum, Cast, Cat. No. 99740, U.S.N.M. ⅔ natural size.

Calves.—Fig. 37 represents an engraving on reindeer antlers from Laugerie Basse, collected by Massenat. The figures are three calves' heads in a row. The reindeer horn has been flattened by cutting or scraping on the sides, and the engraving done on the surface. The object probably served as the handle of a poniard, but the blade is broken off. The top and bottom edges of the handle have been wrought into festoons, with crescents engraved opposite each point of the festoons. The sculpture is entirely ornamental, except so far as it may roughen the handle for prehensile purposes. The opposite side of the handle is similarly engraved.

Fig. 37.

THREE CALVES' HEADS, ON REINDEER ANTLER, BOTH SIDES THE SAME. FRAGMENT OF HANDLE OF PONIARD.

Laugerie Basse.

Collection, Massenat. Cast, Cat. No. 99857, U.S.N.M. Natural size.

Fig. 38 represents an engraved bone from Laugerie Basse. The engravings are supposed to be calves, as in fig. 37.

Fig. 38.

CALVES' (?) HEADS ENGRAVED ON BONE.

Laugerie Basse, Dordogne.

Collection, Massenat. Natural size.

It was one of the peculiarities of the art work of this epoch that in such examples as we are now considering the animals or heads engraved followed each other in single file. They appeared to be always uniform in size, height, age, sex, and species.

Ruminants (?).—Fig. 39 is one of those uncertain animals classed by Lartet and de Mortillet as ruminants, leaving the species undetermined. Lartet says:[1]

> The size and shortness of the shoulder, while excluding the reindeer, the stag, and the horse, might yet serve for a bovine animal, but the fracture at the attachment of the horns deprives us of the means of judging if it be of this character. The withers do not seem high enough for the aurochs; or, at least, they would do only for a young individual. The marks for hair, indicated on different parts of the body, are also distributed with intelligence for the purpose of making the drawing more effective.

Fig. 39.

RUMINANT (?) ENGRAVED ON FRAGMENT OF REINDEER HORN.

Les Eyzies, Dordogne.

Musée St. Germain. Natural size.

The specimen was found by Lartet and Christy in the Grotto Les Eyzies, and is in the Musée St. Germain. De Mortillet believes that the mark on the left shoulder represents an arrow or javelin.

Fig. 40 is an engraving on a reindeer's brow antler palm, found by Lartet in Laugerie Basse. The fracture is old. The fragment bears a bold sketch made by no uncertain hand, of the hind quarters and

[1] Reliquiæ Aquitanicæ, description of plates, p. 14.

barrel of a large bovine animal. That it is bovine is indicated by the smallness of the tail, straightness of the hocks, advanced position of the male organ, and the sudden rise at the withers; unfortunately the fracture occurs where the long, shaggy mane, determinative of the species, ought to begin; but the foregoing are all characteristic of the bison. There is no drawing upon the opposite side.

Fig. 40.

BOVINE ANIMAL, ENGRAVED ON REINDEER'S BROW ANTLER PALM.

Laugerie Basse, Dordogne.

Lartet and Christy. Cast, Cat. No. 8141 U.S.N.M. ⅓ natural size.

The specimen represented by fig. 41 is remarkable in that it was discovered and displayed long before any person in Europe suspected the existence of prehistoric man. This specimen was found in 1824, by M. Brouillet in the Grotto of Chaffaud, in the valley of the Charente. M. Brouillet was a notary at Charroux. He kept this specimen in his collection until the year 1851, when he sent it to the Musée Cluny. The specimen remained there, under the catalogue number of 2467, along with other objects found at the same time—bits of flint, bone points, harpoons, etc.—without attracting attention to its (or their) prehistoric character. It is of reindeer horn and has been broken into three pieces, two of which only remain together. It bears the engraving of two animals, one following the other; the one in front is complete, standing, and at rest, the chin or nose prominent, the lips hanging, and the ears straight and long. The dorsal vertebræ are indicated by a series of vertical marks. The animal has no horns and has the appearance of a hart or doe—the female of the stag or deer kind. The second animal, which follows the first, is cut in two across the shoulders by the breakage of the bone. Its head is finer and its muzzle is more pointed. The ears are straight. This specimen was discovered in the Musée Cluny by M. Gabriel de Mortillet, and his son Adrien made a drawing and a full report of it, which was published on November 25, 1885, in the Magazine l'Homme. This specimen, therefore, is evidence incontrovertible of the genuineness of this and similar objects made by prehistoric man and found in the caverns

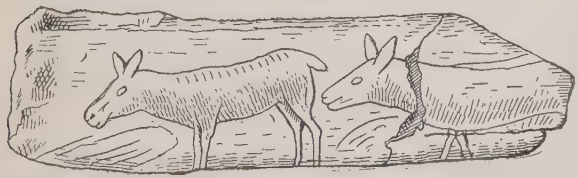


Fig. 41.

HARTS OR DOES, FOLLOWING, ENGRAVED ON REINDEER HORN.

Found by M. Brouillet, 1851, in Grotto of Chaffaud, Charente.

Musée Cluny. ⅓ natural size.

which he occupied of western and southern France. This was found thirty years before anyone had an idea of even the existence of prehistoric man—certainly that long before it was suggested that prehistoric man made or used such objects or ornaments. It was deposited in the principal museum of Paris—still before the discovery of prehistoric man—where it has remained practically until the present time without suspicion of its relation to, or use by, him. It would have remained there unknown but for the fortunate discovery of M. Mortillet.

Fig. 42.

IBEX OR WILD GOAT, ENGRAVED ON REINDEER'S BROW ANTLER PALM.

Laugerie.

Lartet and Christy. Cast, Cat. No. 8142, U.S.N.M. ½ natural size.

Ibex.—Fig. 42 is the palm of a reindeer's brow antler, found by M. Lartet at Laugerie Basse. It bears the nearly entire engraved outline of a horned animal. The horns point upward with a slight backward curve; a short distance behind the horns is an indication of ears; below the chin is a tuft of hair or beard. The croup, tail, and fore feet are destroyed by fractures. The hind legs are sadly distorted in whatever position the animal may be represented; even if he was engaged in scratching himself with his feet, it was impossible that he should scratch his belly with both hind feet at once. But all the characteristics mentioned point to the possibility of an ibex or similar animal. Fig. 43 represents another engraving, also supposed to be of the ibex or goat family, made on a fragment of a reindeer's brow antler palm. Figs. 44, 45, and 46 are engravings of animals of the goat or antelope tribe. Fig. 45 represents the head of a large saiga (antelope). It was engraved on bone and was found by Judge Piette in the Grotto of Gourdon (Haute Garonne). This animal has been extinct in that locality throughout historic times. Fig. 46 represents an ibex engraved on reindeer horn. It was found at Laugerie Basse and is in the collection M. Massenat at Brives. This animal has migrated to the high altitudes.

Fig. 43.

IBEX OR GOAT, ENGRAVED ON FRAGMENT OF REINDEER'S BROW ANTLER PALM.

Dordogne.

Cast, Cat. No. 136641, U.S.N.M. ½ natural size.

Flowers, leaves, etc.—Designs imitating flowers, leaves, and branches

were engraved on harpoon or similar points of bone, horn and ivory. One on a reindeer antler represents flowers with eight and nine petals, respectively.[1] There is a long branch with its leaves on the *bâton de commandement* on reindeer horn from the cavern at the foot of Mont Saleve, Geneva, and the branches with their leaves on the *baton* of Montgardier (fig. 34).

Fig. 44.

HEAD AND NECK OF IBEX, ENGRAVED ON REINDEER'S ANTLER.

Laugerie Basse, Dordogne.

Lartet and Christy. ⅓ natural size.

Fig. 47 represents a truncated harpoon or dart from La Madelaine. In the center and lower part are two representations of what are believed to have been flowers, the upper one with nine petals. Nearer the top is an animal form resembling the outstretched skin of a carnivore with a narrow snout and thick tail like the fox or some allied animal. On the opposite side (not shown in the figure) are two horses' heads placed back to back. This figure is taken from "Reliquiæ Aquitanicæ,"[2] Fig. 5 on the same plate represents a similar implement, on which a horse is carved partly on side and partly on edge, which is unusual in these objects.

Fig. 45.

HEAD OF SAIGA (ANTELOPE) ON A FRAGMENT OF BONE.

Grotto of Gourdon.

Judge Piette. ½ natural size.

Marine animals.—Fig. 48 represents an engraving found by M. Massenat at Laugerie Basse. It is on bone and is rude and incomplete. It is supposed to represent a whale. Fig. 49 shows a seal engraved upon the canine of a cave bear. It is from Sordes cavern (Landes) and belongs to the collection Chaplain-Duparc. Fig. 50 represents an ovibus (?), while fig. 51 represents a fish.

Some of the engravings found in these caverns, while undoubtedly showing human intention and handiwork, are difficult of identification. If we were studying this from the view-points of a biologist or a zoologist it might be necessary to use greater precaution in the naming of the animals, but as they are here considered from an artistic view-point, the special name of the animal is not important. (Figs. 51, 52, 53, 54, 55, 56, 57, and 58.)

Fig. 46.

HEAD OF WILD GOAT ON REINDEER HORN.

Laugerie Basse.

Collection, Massenat. ½ natural size.

Man.—The paleolithic artist was not so successful in his representations of human kind as he was of certain animals. The figure of a man chasing an aurochs (fig. 36) has been described. Fig. 59, on a beam of reindeer horn, represents man, but not in an artistic manner. He is in the midst of a line of horses with a serpent or eel at his heels. It is the fragment of a *bâton de commandement*, was found by Lartet and Christy in the rock shelter of La Madelaine, and is now in the Musée St. Germain. On the other side are figured two calves' heads, one following the other. as usual. Other representations of human form will be noticed in the

[1] Reliquiæ Aquitanicæ, plate B, IX.

[2] Page 70, B. plate IX, fig. 4.

paragraph on sculpture (fig. 69). Fig. 60, *a*, *b*, represents a fragment of harpoon head of reindeer horn on which has been engraved representations of human hands. The two figures represent the obverse and reverse of the same specimen. The four fingers are represented, but the thumb is omitted. Fig. 61 is a faint representation in profile of an inartistic head from Laugerie Basse, collection Massenat.

Fig. 47.
HARPOON OR DART, WITH ENGRAVING OF OUTSTRETCHED SKIN OF A FOX (?). TWO FLOWERS.
La Madelaine.
Lartet and Christy. Natural size.

Examples of art practice.—These art manifestations were intended by their makers not alone for utility, as in the decoration of implements, weapons, and utensils, but they display a love of art for art's sake. Many of them, as already shown, appear to have been made for practice, or from a natural and innate love of the beautiful. They are mere essays, in which the artist used the same piece without any attempted relation of one figure to the other. The sketch of five reindeer, Marquis de Vibraye's collection (fig. 62), is an example. Another is the sketch (fig. 64) of eight animals, horses and deer, from the cavern of Lortet. Each of these specimens consists of a single piece, the lines of each figure running into each other. The drawings have been done on different planes, so that some are upside down, some are complete, others incomplete. The ancient artist utilized his material, as does the artist of to-day when he uses the same canvas again and again. The mammoth engraved on a lamination of his own tusk, and the bear on a flat pebble, are done solely for their art; while the sculpture of the mammoth and reindeer, decoration of the handles of daggers and poniards, are such utilization as put one in remembrance of similar work done by Benevenuto Cellini.

Fig. 62 represents an engraving upon a fragment of schistose slate found at Laugerie Basse by Franchet, and belongs to the collection of the Marquis de Vibraye. It represents five reindeer engraved from different points of view. Two of the animals are shown upright, while three others are represented upside down. One sketch is complete and is well done. Nearly every person has seen similar sketches in modern studios; the artist practices by making different sketches or fragments on the same canvas.

These specimens are evidence of the art tendency of prehistoric man, at least in this locality and epoch. While the evidence points in that direction and is hardly explainable upon any other theory, yet the number of these specimens has hardly been sufficient to establish the

theory in every country inhabited by Paleolithic man. If a greater number of art works had been found, or if the distribution had been more extensive, the general proposition would be better established. We are to remember that in our search for the evidences of prehistoric

Fig. 48.
WHALE (?) ENGRAVED ON BONE.
Laugerie Basse.
Collection, Massenat. ⅔ natural size.

man we are but groping in the dark; we have no, or but few, indications as to the locality of the traces of his existence, and so we may have missed those evidences greatest in number and most important in bearing.

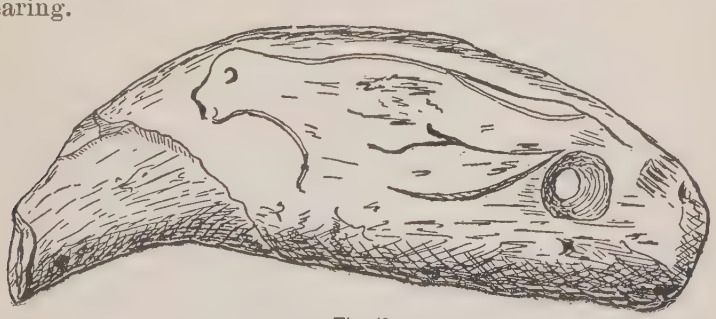


Fig. 49.
SEAL ENGRAVED ON BEAR'S TOOTH.
Cavern of Sordes (Landes.)
Collection, Chaplain-Duparc. Natural size.

Fig. 63 is another specimen of artistic essay, an engraving on bone from Laugerie Basse, in the collection of M. Gustave Marty, Toulouse. It is a fragment of shoulder blade, which we have seen was a favorite material with the prehistoric artist. Its surface is large and flat, and was convenient for the engraver. The artist has made divers essays, and has represented the legs of the horse in various positions and attitudes, always in action, possibly on the trot. Not being satisfied with them one way, he has represented them in another. May not this specimen suggest evidence of the artistic longing of him who may have been an engraver and designer of renown, whose reputation may have resounded along the banks of the Vézère, up and down the Pyrenees, in much the same way that artists from these localities, possibly his descendants, are figuring in the world of art in the expositions and museums of to-day?

Fig. 50.
MUSK-OX.
¼ natural size.

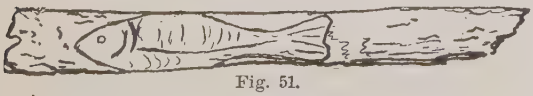


Fig. 51.
FISH.
½ natural size.

Fig. 64 represents another series of engravings in the same tableau. It contains specimens of *equidæ* and *cervidæ* in all postures and from different points of view. This specimen is from the Grotto of Lortet (Haute Pyrenees) and belongs to the collection of Judge Piette. Fig. 65 represents similar sketches in the collection Massenat and from Laugerie Basse. These are all "art for art's sake."

Fig. 52.

ENGRAVING ON BONE FRAGMENT OF UNCERTAIN ANIMAL.

Cast, Cat. No. 14870, U.S.N.M. ½ natural size.

SCULPTURE.

The paleolithic artist did not confine his efforts to the fine arts of drawing or engraving, but included sculpture, and his manual dexterity and artistic ability were more successful in this direction than we would have supposed.

Fig. 66 represents a poniard made from a single piece of reindeer

Fig. 53.

ENGRAVING ON BONE FRAGMENT OF UNCERTAIN ANIMALS, PROBABLY REINDEER, FOLLOWING EACH OTHER.

Grotto of Massat (Ariege).

Collection, Cartail Lac. ⅔ natural size.

horn. The weapon is about 16 inches in length. The blade was first sawed from the reindeer horn longitudinally, then cut or scraped to a point. It is intended for thrusting and not for cutting. The handle is sculptured to represent a reindeer. The blade is a prolongation of the hind legs, the fore legs are drawn close to the belly, and, with the body, form the handle, which can be held firmly, while the head of the animal forms the pommel. The nose is thrown up, which brings the horns on the back, to which they are attached. While the sculpture of this specimen may not be so fine or delicate as some others, or may have deteriorated by use or exposure, yet the general outline is correct and

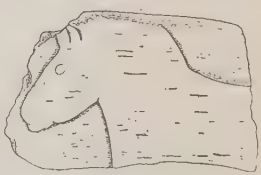


Fig. 54.

ANIMAL ENGRAVED ON BONE, UNCERTAIN.

the animal is well represented. This specimen was found in Laugerie Basse by Lartet and Christy, and belongs to the Musée St. Germain.

Fig. 67 shows one of the most important specimens of sculpture yet found belonging to Paleolithic man. It is sculptured in the round and represents a reindeer. It was the handle of a poniard or dagger and is quite long enough to be easily and firmly held. The reindeer is shown in a conventional manner and in a position suitable for the purpose indicated, much the same as was the former one (fig. 66). The head is thrown back, the nose up, the horns flat upon the back and brought out in relief, the fore legs drawn to the front and the hind legs drawn up and to the rear. Their extension formed the blade. The specimen is ivory, was found at Bruniquel

Fig. 55.

ENGRAVING OF ANIMAL, UNCERTAIN.

Cast, Cat. No. 99858, U.S.N.M. ½ natural size.

Fig. 56.

ENGRAVING OF REINDEER ON BEAM OF REINDEER HORN.

La Madelaine.

Lartet and Christy. ⅔ natural size.

(Tarn-et-Garonne), belonged to the collection of M. Peccedeau de l'Isle, and formed part of the later purchase by the British Museum. It is somewhat remarkable that the finest work of this kind done by the prehistoric man should have been for the handles of daggers or poniards. Some of the most celebrated artists, gravers, and sculptors of mediæval and modern times have employed their talents in much the same direction, and some of their chef d'œuvres have been the handles of daggers, poniards, and swords. Fig. 68 represents a sculpture of a mammoth on the broad part of a reindeer horn. It is the

Fig. 57.

FRAGMENT OF STAG HORN, WITH PORTION OF HOLE DRILLED IN ONE END, AND ENGRAVING OF UNCERTAIN ANIMAL, PROBABLY STAG (*Cervus elephus*).

Engraving on opposite side of sketches

La Madelaine, Dordogne.

Lartet and Christy. Cast, Cat. No. 136625, U.S.N.M. Natural size.

handle of a poniard, comes from Bruniquel (Tarn-et-Garonne) and was found by M. Peccedeau de l'Isle. This gentlemen was an indefatigable searcher. He has made several profound and long-continued investigations. He made almost the entire excavation at the cavern of Bruniquel, and it has been, like several others, emptied; all the earth or débris taken out, sifted, and examined. His collection of these prehistoric engravings and sculptures has lately been purchased by the British Museum, and now forms part of its display of the arts and industries of paleolithic man. I had no right to ask what price the British Museum paid for this collection, but when I saw it in Toulouse its owner demanded for it 40,000 francs ($8,000), and the British Museum must have paid nearly that amount. This specimen was the handle of a poniard, the blade of which had been broken off. The tusks of the mammoth are laid up by the side of the elongated muzzle and are

Fig. 58.

DISC OF BONE. ANIMAL UNCERTAIN, RESEMBLING A CAT, WITH GEOMETRIC DESIGNS FOR DECORATION.

Laugerie Basse.

Collection, Hardy, Dieppe, France. Natural size.

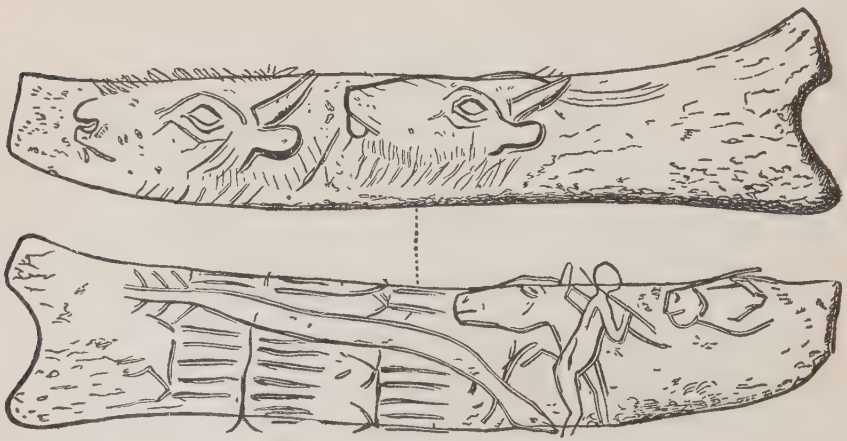


Fig. 59.

FIGURE OF A MAN WITH A STICK OR STAFF ON HIS LEFT SHOULDER ENGRAVED ON A FRAGMENT OF *bâton de commandement*, OF REINDEER HORN. TWO HORSES AND A SERPENT.

La Madelaine, Dordogne.

Lartet and Christy. Musée St. Germain. Cast, Cat. No. 136864, U.S.N.M. ¾ natural size.

represented in a conventional manner. The feet are brought together, owing to the requirements of the material. The tail is represented as curled up over the back, which proves it to have been a mammoth rather than an elephant. The tail was broken by the artist in manufacture and, in order to repair it, a hole was drilled down through the backbone and a new tail inserted. The representation of it here shows

the tail displaced; not in its proper position, as was the original when I saw it. Fig. 69 represents a fragment, important in its lesson on paleolithic art. It is a female figure sculptured in ivory. It is without head or arms and almost without feet. The breast is flat, the sexual organs exaggerated, and the hips prominent. It was found at Laugerie Basse and belongs to the collection of Marquis de Vibraye.

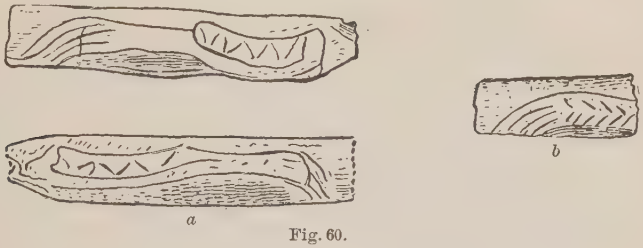


Fig. 60.

(*a*) FRAGMENT OF HARPOON OF REINDEER HORN ENGRAVED WITH TWO HUMAN HANDS, ONE ON EACH SIDE.
La Madelaine, Dordogne.
Lartet and Christy. British Museum. ⅜ natural size.
(*b*) HUMAN HAND ENGRAVED ON A FRAGMENT OF HARPOON OR REINDEER HORN.
La Madelaine, Dordogne.
Lartet and Christy.

Judge Piette's persistence and success as an explorer into the prehistoric stations of the Paleolithic period in France have already been mentioned. One of his most extensive and successful explorations was in the cavern of Brassempouy at Chalosse (Landes). The usual stratification of occupation was found, beginning with the early Paleolithic at the bottom and progressing successively through the later epochs toward the top. The mammoth and rhinoceros, cave bear, cave hyena, and reindeer were found in their respective strata. Ivory was sufficiently plentiful to be dug out by the spade full. Worked points of bone and horn, flint points, scrapers, and flakes, and similar evidence of human occupation abounded. Engravings on bone and horn were found as in other paleolithic caverns in the district. In stratum E, about 18 inches in thickness and at a depth of 11 to 12 feet, specimens of the human form were found sculptured in the round from ivory. The collection of Judge Piette contains nine statuettes of the human female figure in ivory, seven from Brassempouy, one from Mas d'Azil, and one from Laugerie Basse. They were divided into two groups. One represented women, fleshy, gross, with breasts pendant, abdomen round and protuberent, and thighs firm and heavy. One of these Judge Piette has named the Venus of Brassempouy. The second group were the reverse of all this, with figures thin and straight, without protuberances, and slight representation of flesh or muscle, having much the same appearance as fig. 69. One of the latter group, more complete than any other, represented a female head covered with a capuchin bonnet.

Fig. 61.
HUMAN HEAD.
Laugerie Basse.
Massenat.

Reproduction of these figures without special license has been interdicted, but anyone can see them in the report.[1]

Fig. 70 represents, in a rude and conventional manner, a human head

Fig. 62.

FRAGMENT OF SCHISTOSE SLATE WITH FIVE REINDEER ENGRAVED THEREON, SIMPLY UNFINISHED AND FROM DIFFERENT VIEW POINTS. ART TRIALS OR SKETCHES.

Laugerie Basse.

Found by Franchet. Collection Marquis de Vibraye. ⅓ natural size.

sculptured from a fragment of reindeer horn 2 or 3 inches long. It was found by Abbe Bourgeois in the Grotto of Rochbertier (Charente), and is in the museum of the Ecole d'Anthropologie, Paris. It is from the same department as the *bâton de commandement* of Montgardier (fig. 34). Fig. 71 represents a fragment of reindeer horn of which two tines or palms have been sculptured in the form of horses' heads. It is from the Grotto Mas d'Azil (Ariege) and belongs to the collection of Judge Piette.

Fig. 63.

ENGRAVINGS ON BONE, TRIAL SKETCHES.

Laugerie Basse, Dordogne.

Collection Marty. Toulouse. ⅔ natural size.

Figs. 72 to 77 represent other specimens of Paleolithic sculptures from divers caverns of the period in the same general localities as those heretofore figured. They show different objects and do not require separate descriptions.

The engravings and sculptures found in excavations of the caverns of this epoch have been, for the most part, but the débris—broken and rejected pieces. They have been found principally among the ashes from the hearth, and are rarely perfect or complete. During this

[1] L'Anthropologie, VI, 1896, plates I–VII; VII, 1897, plate I, p. 168.

period there does not appear to have been any care or preservation of anything for future generations, for there were no tombs, no burials, no monuments, and, except the caverns, no habitations. There appears to have been neither opportunity nor incentive to preserve such objects. But in the fragments we can recognize the artistic feeling of the people. It is even contended by some investigators that different schools of art

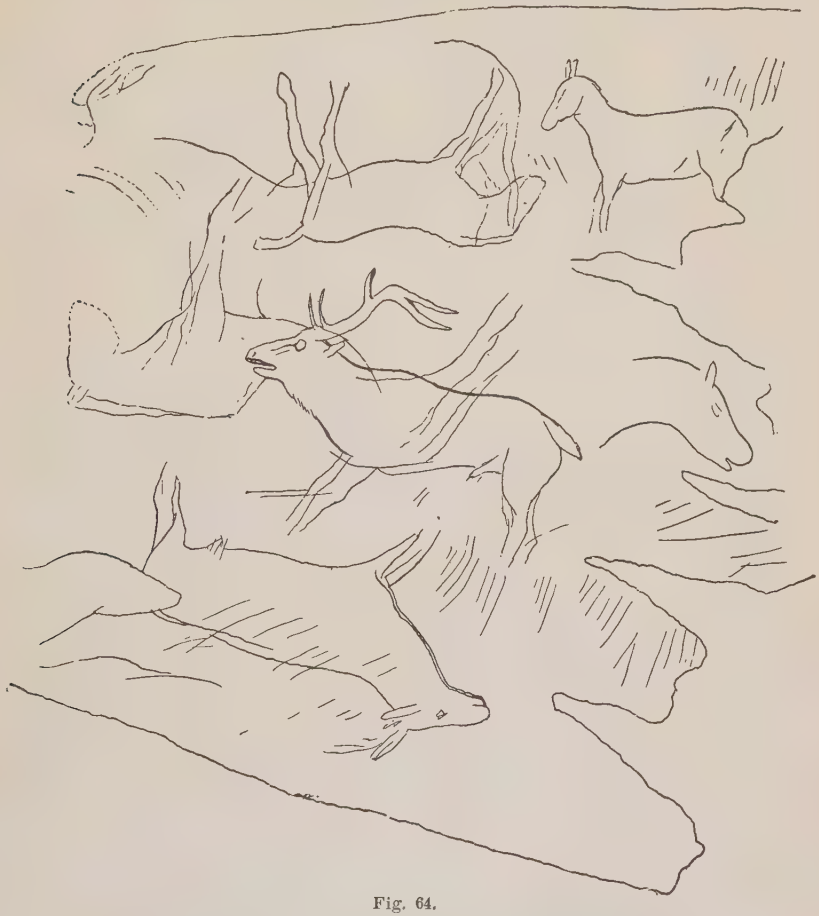


Fig. 64.

HORSES AND DEER, TRIAL SKETCHES ON FRAGMENT OF SHOULDER BLADE.

Grotto of Lortet (Haute Pyrenees).

Collection, Piette. ⅔ natural size.

can be recognized in different localities; that the art of the Pyrenees was different from that of the Dordogne, and the same between the caverns of Switzerland and Savoy and those of western France. The animals represented have been done with sufficient exactness to enable us to determine what was intended. M. de Mortillet has said that while we are here in the presence of the infancy of art it is far from being the art of an infant, and MM. Cartailhac, Chauvet, Piette, Perrot, and

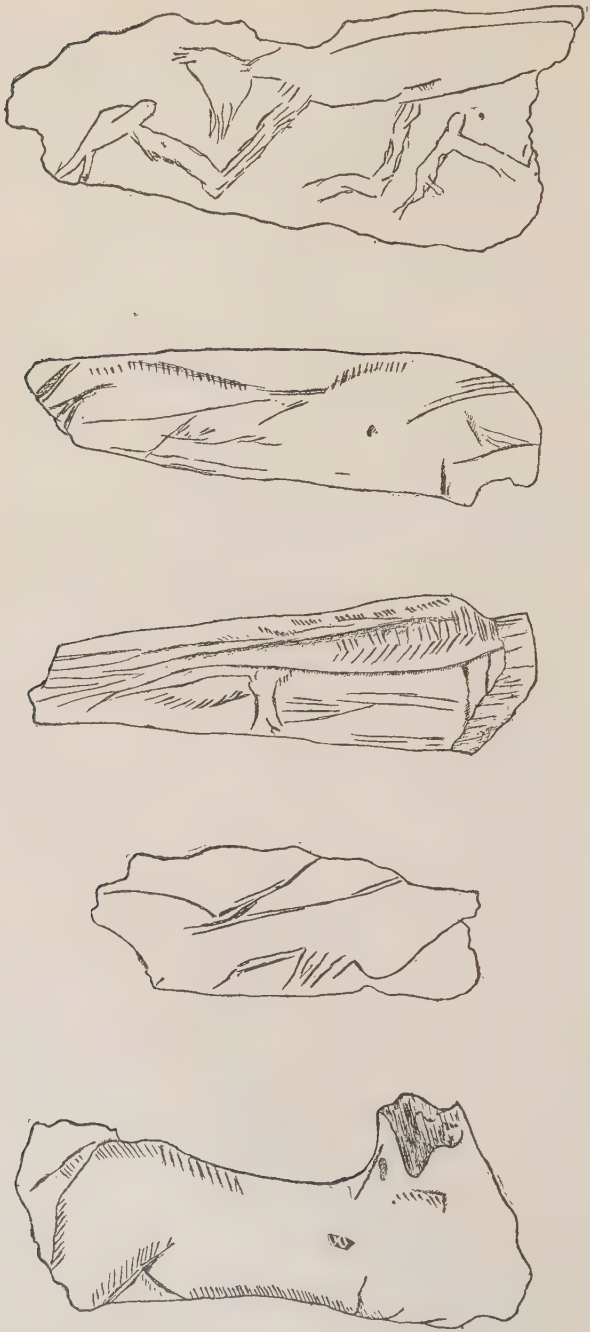


Fig. 65.

VARIOUS UNCERTAIN ANIMALS, ENGRAVED ON BONE, TRIAL SKETCHES.

Laugerie Basse.

Collection, Massenat.

the others who have written upon this subject have followed him in this. These, with other introduced specimens, show the innate desire of man for things beautiful and his natural wish to make them so. Philosophers, psychologists, and even anthropologists have theorized and speculated as to what aboriginal or natural man may have thought, wished, or desired in originating art, and they will continue to do so; but we are, by this work, brought face to face with the solid and irrefutable fact of what he did. The artifacts are our only evidence in this regard. We are dealing with the prehistoric. There is no history, no written record, no record at all, other than these objects. As by them only do we know of the existence of man at this epoch, so by them only can we discover the origin of the art by which they were made and the thoughts, wishes, and desires of the man who made them.

Fig. 66.

SCULPTURED POMARD OF REINDEER HORN, THE HANDLE REPRESENTING THE REINDEER HIMSELF.

Laugerie Haute, Dordogne.

Collection, Massenat. Cast, Cat. No. 1194, U. S. N. M. ⅓ natural size.

In order to justify any speculation concerning the ratiocination or psychologic manifestations of primitive man in matters of art or decoration, it is proper we should first know as much as possible of the facts of those manifestations. Almost the sole purpose of this memoir is to collate and present these facts. Its title declares this purpose. With mere speculations it has little to do, but in the presentation of facts concerning the origin of human art as shown in its earliest known manifestations it makes serious claims.

The specimens of engraving and sculpture may be divided as follows: (1) The engraving by simple lines cut in plain surfaces which corresponds to the engraving of our own time; (2) engraving more or less in relief, and (3) sculptures in the round, representing human or animal figures. Piette reverses their order and contends that they occurred thus.

METHODS OF ENGRAVING AND SCULPTURING.

The manner of working would seem to have been as follows: With the aid of flint instruments, which may have been knives, flakes, points, scrapers, or what not, the surface of the material was prepared by the removal of the outside or rough portion. The reindeer horn was preferred to that of other deer, probably because its surface was smooth

and firm. These pieces of flint or similar ones are always found associated with the engravings. The surface having been prepared, the objects to be represented are outlined, probably, by marks with the graver, cutting away the substance to a greater or less depth, according to the sketch desired. The knives, flakes, and gravers may have

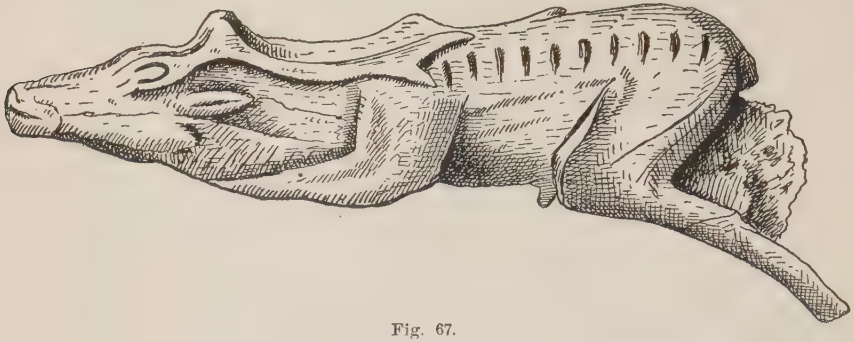


Fig. 67.

SCULPTURED REINDEER IN IVORY; HANDLE OF A PONIARD WITH BLADE BROKEN AND LOST. THE NOSE IS THROWN UP AND THE HORNS LAID ON THE BACK.

Cavern of Bruniquel (Tarn-et-Garonne).

Collected by Peccedeau de l'Isle and sold by him to the British Museum. Cast, Cat. No. 8146, U.S.N.M. Natural size.

been inserted in handles or operated directly by hand. No evidence has been found of the actual employment of a handle. The scrapers are more likely to have been so used, for the same implement inserted in a handle has been employed in modern times by the Eskimo.

In the sculptures the surface, after having been reduced to proper form, seems to have been polished by rubbing, and accordingly there is found just such an implement as would perform this service, and no other service than this has ever been suggested to account for the existence of the implement. It is a piece of flint, called in French *retouchoir*,[1] rudely chipped into the general form of a man's forefinger. The extreme point of the finger is smooth and polished, evidently the result of much rubbing, and apparently not done by grinding.

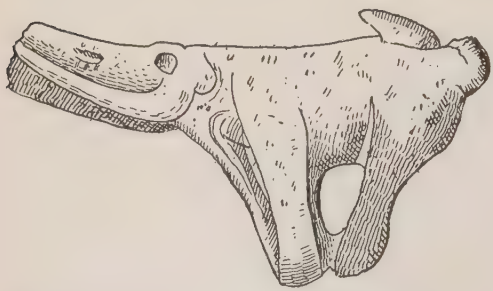


Fig. 68.

MAMMOTH SCULPTURED ON PALM OF REINDEER HORN. HANDLE OF PONIARD, WITH BLADE BROKEN.

Bruniquel (Tarn-et-Garonne).

Peccadeau de l'Isle. British Museum. Cast, Cat. No. 8174, U.S.N.M. ⅓ natural size.

Of course this description and the assignment of these utensils is more or less theoretical, but it is not open to the objection of many of the theories propounded by wise men of our day, for—

(1) The existence of these objects is certain.

[1] De Mortillet, Musée Prehistorique, plate XLV, figs. 411–417.

(2) They were made by the man of the Paleolithic period.

(3) With these tools and implements it is quite possible to do the art work ascribed to that period.

(4) With the engraving implements and tools herein described are found other objects made by man, and all these are associated in sufficient numbers to establish their common use.

From these facts the conclusion is drawn that the work was done with these implements.

Fig. 69.

IVORY SCULPTURE REPRESENTING A WOMAN (HEADLESS).

Laugerie Basse. Collection, Marquis Vibraye.

MATERIAL.

Stone, ivory, bone, horn, wood.—There are several engravings and sculptures in stone, but they are comparatively few. The fragments of two such were found at the station of Solutré, but it is not well determined what animals they were intended to represent. The great cave bear on a waterworn schist or schistose pebble, found at the Grotto of Massat; a horse found at Les Eyzies by Lartet and Christy; and the sketches on slate of five reindeer from La Madelaine; with some small examples from the Grotto of Chaffaud, are the principal examples of the use of stone.

Ivory was employed principally for sculpture, as witness the discoveries of Judge Piette at Brassempony and Mas d'Azil just described (pp. 374 and 400), though the representation of the mammoth on his own tusk, found by Lartet at La Madelaine, was an engraving. The teeth of animals were also employed. The canines of the bear have been found with a seal engraved in feeble relief.

Fig. 70.

HUMAN HEAD RUDELY ENGRAVED ON A FRAGMENT OF REINDEER HORN.

Grotto of Rochebertier (Charente).

Found by Abbé Bourgeois. Museum of School of Anthropology, Paris. ½ natural size.

Shoulder blades and ribs were often utilized. Deer horns frequently served, but the material does not seem to have been altogether satisfactory to the prehistoric artist. The reindeer horn answered better. It was smooth, hard, homogeneous, tough without being fibrous, and would cut or scratch in any direction. It furnishes about three-fourths of the specimens of the art work of the period.

Wood may have been employed for art work, but of this we have little or no proof. Reasoning by analogy, we may conclude that it was so used. It was easier to work than was bone or horn, and would serve equally as well for many objects. The objection that no such specimens of wood have been found is offset by the answer that they may have all decayed.

PAINTING.

While the art products of Paleolithic man ran principally to sculpture and engraving, there is evidence of his acquaintance with and practice of the art of painting. Color has been used in decoration by prehistoric man.

Fig. 71.
HORSES' HEADS SCULPTURED FROM REINDEER HORN.
Grotto Mas d'Azil (Ariege).
Collection, Piette.

Judge Piette made extensive excavations in the Grotto Mas d'Azil (Ariege), France, and reported interesting discoveries relating to prehistoric art in the direction of painting. He assigned this art to a time near the close of the reindeer epoch of the Paleolithic period, to which he gave the name Asylienne. The characteristics specially noticeable in the present connection were the hundreds of waterworn pebbles, flat, oval, with rounded edges, resembling in size the net sinkers of eastern United States, which had been painted or colored in different figures. A series was exhibited by Judge Piette at the Paris Exposition, 1889, where the author had good opportunity for their inspection. Judging from their appearance and material, the pebbles had been gathered in the bed of the stream Arise, which flows through the Grotto Mas d'Azil. They were of quartz, quartzite, and schist, and run from white to gray. They were artificially colored with iron peroxide, still found in the cavern. It was ground and kept in shells (*Pecten jacobæus*) and in cup stones, specimens of which were found with the paint still in them, and was served with spatulas of bone. The color was red or reddish, rather maroon, about the color of iron rust. The figures consisted of dots

Fig. 73

Fig. 74.

Fig. 72.

Fig. 76.

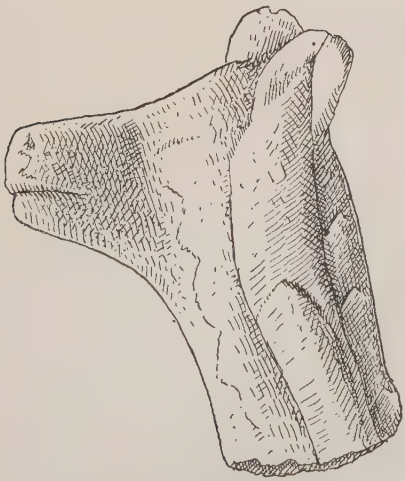


Fig. 75.

Fig. 77

Figs. 72–77.

VARIOUS SPECIMENS OF PALEOLITHIC SCULPTURE FROM DIVERS CAVERNS OF THE PERIOD IN CENTRAL AND SOUTHERN FRANCE, NOT REQUIRING SEPARATE DESCRIPTION.

Cast, Cat. Nos. 99860, 99856, U.S.N.M. All natural size.

from one-fourth to one-half or five-eighths inch in diameter, placed in rows on the flat sides of the pebbles, from one to eight on each pebble; of bars or parallel bands of the same character; of zigzags, crosses, some circles with central dot, and others of similar designs in great number. The painting can best be described by supposing much of the work to have been done by light touches of the finger. It was Judge Piette's theory that these marks and signs had some meaning. They might have formed a numerical system. Still others may have been alphabetic or ideographic signs, still others symbolic. These pebbles were found in a particular stratum of the grotto. They were not placed in any order, but were scattered throughout the stratum. The meaning of the painted designs on these pebbles has never been decided and probably never can be; but in our present state of knowledge they represent man's earliest use of color for purposes of decoration; and, consequently, were the very beginning of the art of painting.[1] They may be more than this, but of this much we may feel certain, that whatever was intended by their makers, whether they were for ornamentation only, "art for art's sake," or had some special signification as numbers, signs, symbols, etc., they were surely an appeal to the color-sense through the eye, and so represent the very beginning of the painter's art. They were an advance upon the glyptic art which had theretofore prevailed, and had thus far been the only artistic manifestation by man.

For description of the excavation of Mas d'Azil see "Etudes d'Ethnographie Prehistorique," by Judge E. Piette,[2] and for illustration of the colored pebbles see supplement to same paper.[3]

The employment of colors in the execution of savage art can be traced to a considerable antiquity; and their use, though continued into modern times, does not at all depend upon the intervention of civilized man.

The original mineral colors were probably the red and yellow ochers, red and yellow iron oxides, black from charcoal, and white from chalk and lime; but vegetable colors were not difficult to obtain from leaves, fruits, roots, stems, and seeds; for the extraction and use of these pigments and colors in the various savage decorations and adornment was not above the most primitive conceptions. While there is no trace of the use of colors in Paleolithic times in Europe until the late discovery of Judge Piette, and but little in Neolithic times of that country, yet the employment of colors by prehistoric peoples of other countries was extensive and effective. Beyond this, it displayed considerable power and was withal difficult of execution.

The use of an extensive scale or palette of colors by our North

[1] The coloring of human bones preparatory for secondary burial is not forgotten; but it was ceremonial or religious and not decorative; besides it was later.

[2] L'Anthropologie, VI, 1896, pp. 274–292.

[3] In quarto, 25 plates, chromolithograph.

American Indians is well known. The works of Col. Garrick Mallery on "Picture writing of the American Indians," of Dr. Washington Matthews on the Navajos, of Dr. W. J. Hoffman, Dr. J. W. Fewkes, Mr. F. H. Cushing, Col. J. J. and Mrs. Stevenson, and others, are filled with illustrations of the use of color by these savages. One has only to call to mind the descriptions and representations of the early travelers, or the pictures of Catlin, whose "Gallery of Indian portraits" is in the National Museum[1] to recognize the fact. These instances, while perhaps all historic, are representative of culture beginning before the advent of the white man.

The Peruvians and the Mexicans were adepts in placing the colors upon their cloths. The colors were so well fixed that they were not even modified by the decomposition of the dead bodies, and the wrappings of mummies buried centuries ago retain their primitive colors, even when the original fabric is decayed to shreds.

The Mexicans probably obtained the remarkably brilliant coloring of their pictographs by somewhat analogous processes. These pictographs in manuscript, of which only a small number have reached us, embrace the history of the country, its national traditions, the genealogies of its kings and nobles, the rolls of provincial tributes, the laws, the calendar, religious festivals, and the education of the children—a complete summary, in fact, of all that concerns the manners, customs, and life of the people. They were painted in various colors on cotton cloth, on prepared skin, or on a strong and tough paper made from the fibers of the agave. At times the artist depicts scenes from real life. At other times he records facts by means of hieroglyphic, symbolic, or other characters—conventional signs that have been handed down for generations, and on which innovation is prohibited. Another series of pictures illustrates the education of children, their food and punishments. The father teaches his son to carry burdens, to steer a canoe, or to manage the fishing tackle. The mother instructs her daughter in domestic duties; she sweeps the house, prepares tortillas, and weaves cloths. These pictures present the distinct outlines and bright colors which the Americans sought most of all. Evidently we must not ask them for models of decorative painting. Their complete ignorance of proportions and the laws of perspective demonstrates that their art was the exclusive product of their own genius or of the instinct of their race, and that they had not been subject to any foreign influence.

The region of *piedras pintadas* (painted stones) in South America extends from Guiana to Patagonia. They are found in the wilds of Brazil and La Plata as well as in the more civilized districts of Peru and Chili, and they betray everywhere a remarkable analogy. In the solitudes of Pará and Piauhy, Brazil, are numerous intaglio sculptures executed by unknown peoples. They represent animals, birds,

[1] Report of the U. S. National Museum, 1885.

and men in various attitudes. Some of the men are tattooed; others wear crowns of feathers; and the picture is finished with arabesques and scrolls. At La Sierra de Onça are drawings in red ocher, isolated and in groups, without apparent order; and the rocks of the province of Ceará and those of Tejuco are covered with tracings not unlike those on the rocks of Scandinavia. Humboldt describes intaglios on the right bank of the Orinoco representing the sun, moon, pumas, crocodiles, and serpents, ill-formed figures defined most frequently by a simple outline and manifesting slight advancement in art.

CHARACTERISTICS OF THE ART OF THE PALEOLITHIC PERIOD.

A few words as to the characteristics of the art of the Paleolithic period. It has been already said there were some geometric designs. These were by lines or dots, and, curiously enough, never or rarely in the form of a cross, triangle, square, or circle, concentric or otherwise. They consisted of parallel lines, sometimes crossed, sometimes drawn in different directions, zigzags, chevrons, and sometimes the double chevron, giving it the appearance of the letter X. On some of the long, straight instruments of bone appear undulating, wavy lines, and in a few cases are round, slightly pointed projections—protuberances like a mamelon.

In all these combinations of figures none have been found which seem to have any meaning or to have the form of any letter, word, or hieroglyph. They do not correspond to any sign, ideographic or hieroglyphic. The cross is not found; there is no representation of sun worship, nor of the sea, nor of any divinity, good or bad. Apparently there had been no thought other than that apparent upon the face of the picture. For instance, when horses are represented following each other we can understand there is a drove. When the mammoth is represented, we understand that the artist has seen the animal. When a man is represented following the bison and in the act of throwing his spear, we can understand that a hunting scene is meant. Beyond these and similar views no ideas seem to have been attempted. But we are to remember the paucity of the sources of our knowledge.

The designs, whether of drawing, engraving, or sculpture, seem to have been original in so far that they were neither copied from other drawings nor adapted from other schools or masters. They do not seem to have been composed pieces, but drawings made direct from nature with the original before the eye of the artist. Those representing the two horses' heads and that representing the hind legs of the reindeer and the naked woman would appear to have been of this kind.

There have been found in western Europe about four hundred specimens of this engraved and sculptured art work belonging to the Paleolithic period. Of these, four-fifths are representations of animals. How many sketches—mere essays or attempts—have been found, the author has no means of knowing. These are on fragments and are not sup-

posed to have had any utility. Of the implements intended for use and thus decorated, the *bâtons de commandement* are in the greatest number; then dagger points of deer and antelope horn, and the handles of poniards. The Musée St. Germain possesses one hundred and sixteen objects of the art of this epoch. Among these are twenty-nine *bâtons de commandement*, twenty-two daggers of antelope or deer horn, and five handles of poniards; total of these specimens fifty-six, or about one-half the entire art collection of that museum. The rest are either objects of unknown use or else sketches not intended for any use.

The United States National Museum possesses one hundred and fifty-six specimens, originals and casts, belonging principally to the Wilson collection.

LOCALITIES.

Be it understood that only those stations or caverns in which art objects have been found can be reported. We can easily believe that there are many wherein they exist but have not yet been discovered.

Industrial objects and implements are found associated with the art objects, and consequently were made by and belonged to the same people, and these are disseminated throughout western Europe in almost every locality occupied by Paleolithic man. These localities extended from the Pyrenees to central England and from the Atlantic Ocean to northeastern Switzerland. Divided according to departments in France, cantons in Switzerland, and shires in England, the distribution, with the names of the principal caverns containing this art work, is as follows:

Beginning with the department of Dordogne, which has furnished about one-third of the number found, the caverns are: La Madelaine, Laugerie Basse, Laugerie Haute, Gorge d'Enfer, les Eyzies, Cornac; Mayenne—Cave Margot; Vienne—Cottes, Chaffaud; Charente—Chaise, Montgaudier, Placard; Tarn-et-Garonne—Bruniquel; Landes—Sordes; Haute Pyrenees—Auresan, Lortet; Haute Garonne—Gourdan; Allier—Massat, Vache; Aude—Bize; Gard—Pont du Gard; Haute Savoy—Saléve; Schaffhausen, Switzerland—Thayingen; Arrondissement de Dinant, Belgium—Goyet, trou Magrite; Derbyshire, England—Cresswell.

Discoveries of paleolithic art are being continuously made in western Europe, thus demonstrating the correctness of former conclusions and the genuineness of former discoveries as well as the long and extensive human occupation in paleolithic times. Some of those reported since the writing of the foregoing chapter are that of M. Julien of the statuette in steatite of a woman in the caverns of Mouton, now in the museum of St. Germain, reported by Solomon Reinach;[1] that of E. Riviére in the grotto of la Mouthe, Commune de Tayac, near Les Eyzies, Dordogne, wherein the art work consisted principally of carvings of animals on

[1] L'Anthropologie, 1898, p. 26, plates I, II.

the rocky walls of the cavern[1] associated with objects and evidences of Madelainien art, gravers bone points, etc.; further discoveries of M. Riviére in the celebrated Cavern of Cro-Magnon at Les Eyzies.[2] There not only former paleolithic objects of industry were continued, but the gravers and engraved bones were found, the most important being a fragment of rib bone with the figure of a female engraved in profile and at full length. Also art works similar to those in the Grotto de la Mouthe found in the cavern of Pair-non-Pair, excavated by F. Daleau (Bourg-sur-Gironde) and F. Regnault.[3]

SUCCESSION OF ART PERIODS.

The nomenclature of the different art cultures heretofore described belonging to the Paleolithic period in Europe is of small importance compared with the facts of their superposition and succession in point of time and their evolution in art. The fact of progression from an earlier and ruder to a later and higher art culture seems to have been satisfactorily established by investigation of the caverns themselves. The caverns were gradually filled up, either by natural or artificial causes, or by both. By examining the strata in their succession the investigators have demonstrated that there are marked differences in the art and industry between the objects found in the different strata. Of course, the filling up of the caverns must have been in chronologic sequence. Superposition means succession. The distinction between the various epochs in the Paleolithic period or the distinctions between the Paleolithic and Neolithic periods are not to be discussed here. The reader is referred to standard works upon the subject. A list of these is given in the Handbook[4] and in Primitive Industry.[5]

A few salient facts may be presented showing this superposition and consequent succession, explaining an improvement in art culture from the bottom of the cavern toward its top. For example, at Kent's cavern, near Torquay, England, in the caverns investigated with all possible care during a period of twelve or thirteen years, in which as many thousand dollars were expended, under the direction of a committee appointed by the British Association, the strata of these early occupations were covered by layers of stalagmite spread over what was then the entire surface, separating and sealing it hermetically from subsequent occupation. Under this, in various parts of the cavern, were found specimens of Chellóen chipped-flint implements, and beyond the chips and flakes, possibly the hammers incident to their fabrication, no

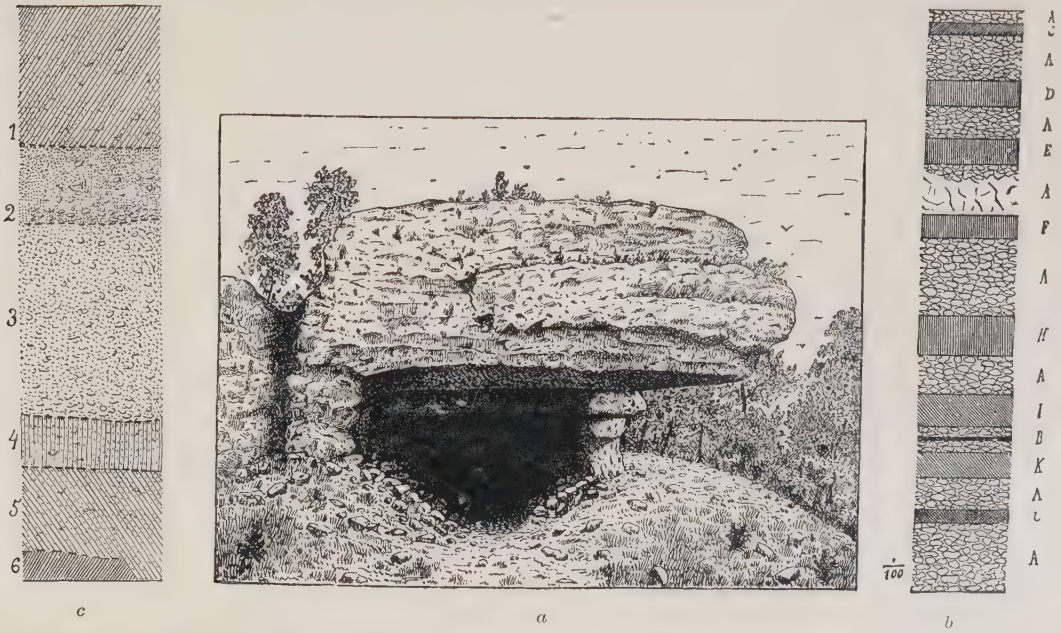
[1] Bull. Soc. d'Anthropologie, Paris, July 1, 1897, VIII, pp. 302–329; November 4, pp. 484, 497.

[2] Nouvelle's recherches anthropologiques et palèontologiques dans la Dordogne (Assn. française pour l'Avancement de la Science, Caen, 1894); Bull. Soc. d'Anthropologie, Paris, November 18, 1897, VIII, pp. 503–7.

[3] Bull. Soc. d'Anthropologie, Paris, 1897, VIII, p. 315.

[4] Report of the U. S. National Museum, 1887–88, pp. 597–672.

[5] Smithsonian Report, 1892, pp. 522–534.



a, PERSPECTIVE VIEW AND (*b*) SECTION OF THE CAVERN OF PLACARD (CHARENTE), FRANCE. *c*, SECTION OF THE PREHISTORIC CAVERN OF SCHWEITZERBILD, SWITZERLAND.

Strata showing superposed successive epochs of culture.

Report of U. S. National Museum, 1896.—Wilson.

other traces of human industry was found. In the Grotto of Placard in southwestern France (Plate 17), the same superposition was found, which gave satisfactory evidence of this succession of human occupation and of the accompanying changes and improvements of human culture. The strata containing Neolithic and Paleolithic objects are distinctly marked, and are separated by a sterile stratum made up of imported clay, or earth or of broken stones from the roof of the cavern, several, sometimes many, inches in thickness. The cavern of Laugerie Haute gives the same evidence and is even more positive, for the sterile stratum is about 4 feet 3 inches in thickness. In the Grotto de la Vache the stalagmitic stratum between the Paleolithic and Neolithic industries is about 18 inches. The latest indications we have was when M. Boule, of Paris, visited the prehistoric cavern of Schweitzerbild, near Schaffhausen, Switzerland, in the neighborhood of the cavern of Thayingen which furnished the celebrated engraving on bone of the reindeer browsing (fig. 24, p. 381). M. Boule has published a report of his investigations[1] in which he describes the walls of the cavern with their superposed and consequently successive occupations and corresponding improvements in human invention and human culture. (See Plate 17 *c*.)

Plate 17 (fig. *a*) shows a perspective of the Grotto of Placard with a section on the right side *b* giving the various strata from bottom to top. The spaces marked *A*, ten in number, show the strata which were barren, and were without any objects or evidences of man's industry or occupation. They were formed of rock which had fallen from the roof to the floor during periods when the cavern was not occupied by man. The other letters represent spaces, the strata of which were the opposite of this, and contained objects representing the various epochs of human culture within the period of occupation. *L* contained Mousterien points; *K*, Solutréen leaf-shaped points; *I*, upper Solutréen, with bone points and those of flint, shouldered (pointes a crân); *H*, *F*, *E*, and *D*, contained objects clearly Madelainien, bone points, engraved bones, and even a *bâton de commandement; C*, the archæologic stratum nearest the top, contained Neolithic objects, polished stone hatchets, arrow points, fragments of pottery, and bones of modern animals.

The same difference of industry, showing a difference in culture by the stratification in the caverns, occurs in the investigations by Judge Piette in the large number of caverns in southern and southwestern France, and referred to in this paper (p. 374). In fact, this stratification of culture is the foundation of his classification.

At the conclusion of the excavations and investigations by Lartet and Christy, it was the opinion of many prehistoric archæologists that there was a complete solution of the continuity in the human art and industry, as there was in the human occupation of western Europe at the close of the Paleolithic period. This opinion grew in strength until nearly everyone became an adherent of it. It was evident that the

[1] Nouvelles Archives des Missions, III, plate III (plate 17, fig. *c*).

animals which occupied that country during that period materially changed their habitat. The causes of this change have never been completely determined, but it is supposed that climate was the principal one. The fact of the change seems well established. The three species of Elephas—the last being the mammoth, the cave bear, cave lion, cave hyena, and several others—became extinct. Others—the musk ox, blue fox, and more than any other, the reindeer—to the number of thirteen species of animals, all cold loving, migrated to the far north and have never since occupied any portion of the territory in western Europe wherein they were so plenteous during this Paleolithic period. Five other species of animals, like the chamois, also cold loving, changed their habitat by migrating to the mountains, thus making a complete change of eighteen animals at the close of that period. What became of man? It was believed, as has been said, that he also migrated or perished. At all events, it has come to be the general belief that the evidences of his presence, by objects of either art or industry, ceased altogether; that there was a hiatus in the occupation of that country by man, which was brought to a close by the migration or entry from the far east, of Neolithic man or man with a Neolithic civilization. The differences between these two art epochs will be treated in the next chapter.

Learned men have speculated considerably concerning the happenings at the close of the Paleolithic period in their relation to man. This was necessarily speculative. It was impossible to procure definite or positive testimony. The only evidence obtainable consisted of the remains of man or of his art or industry, while the chronologic identification of these as subsequent to the Paleolithic period was extremely difficult, if not impossible. One theory is that he migrated to the north, as did the animals which were his contemporaries. The similarity between the art of the Eskimo in carving on ivory and those carvings found in the caverns in southern France and described in this paper has furnished the foundation for this theory. Another theory is that man in western Europe at the close of the Paleolithic period perished. A third theory is that he migrated to the far east, the Orient, assimilated with the peoples there, became a part of the Aryans, and that his art, taking a new lease of life, began its western peregrinations through Mesapotamia, Chaldea, the Caucasus, and culminated in Greece, where it formed another center of culture, and, spreading through Italy in the period of its decadence, it at last reached western Europe, the place of its origin and birth.[1]

A fourth theory is that he went—just how is not explained—to the north of Africa. The foundation or authority for this is the supposed resemblance in the anatomical and physical characters between some of the tribes belonging to that country and the Paleolithic man of southern France. The Berbers of Africa and the Guanches of the Canary Islands and the Caribs of still other islands in the same

[1] Solomon Reinach, La Sculpture en Europe; l'Anthropologie, V, pp. 19–21.

GROUP OF ARTISTS OF THE CHELLÉEN PERIOD ENGAGED IN CHIPPING FLINT IMPLEMENTS.

FAMILY OF THE MADELAINIEN EPOCH, WITH REPRESENTATION OF THE ROCK SHELTER OF LAUGERIE BASSE.

From groups at Paris Exposition, 1889.

latitude or direction are said to be of the same stock as the cave dwellers of France.

But these are archæological or anthropological questions, only incidentally affecting art, and therefore need no further argument or citation of authority.

THE ASPECT OF MAN OF THE PALEOLITHIC PERIOD.

Of course no man of any of the epochs of the Paleolithic period has ever been seen, and therefore he is not described by any person of modern or historic times. No history, however ancient, will contain any representation of him. Egyptian, Chaldean, and other Oriental civilizations may contain sculptured representations of man of high antiquity, and possibly one can not say that these were not individuals of prehistoric ages, but no one can say, with any certainty, that they are. Any attempt to reproduce or represent the cave man must be largely theoretical. We have some of his skulls and long bones. We have his pictorial representations as shown by the engravings of that time and figured in this paper (fig. 36). It is said by those anthropologists who have investigated the subject most profoundly, that the Berbers of northern Africa and the Caribs of the islands in the Atlantic Ocean most nearly correspond with the man of Paleolithic times. They judge this by comparison of the anatomy and from a consideration of the evidence. With this for a foundation, the anthropologists of the Paris Exposition of 1889 reproduced groups of the people of the Paleolithic period, which were installed on the foyer of Anthropological Hall. Plate 18 represents two of these groups. Fig. 1 is a man and a woman of the Chelléen epoch, represented in the act of chipping flint nodules and making the implements belonging to their epoch, such as are shown in figs. 1 to 9. Fig. 2 of plate 18 is a reproduction of the cavern of Laugerie Basse, representing a man standing, just returned from the chase; while seated opposite him are two women, presumably his wives, engaged in engraving the bones of the cavern, some of which have possibly been shown in this paper.

Whether the statuettes found by Judge Piette and forming part of his collection were actual representations of the peoples who made them or who inhabited the localities is not determined. Piette is of opinion that they were, and that the specimens represented two groups or races of people—one fat and heavy, the other thin and light.

CONCLUSIONS.

Sundry modern authors have enunciated various theories of art, based upon the pyschologic proposition of the parallelism of human thought and the similarity of human needs. With this and the assumption of a permanence of the relations of man to his environment for a foundation, they have formed the conclusion that peoples or tribes in a given stage of culture adopt similar arts and indeed a general

technologic similarity. They assert the foregoing rule to be a natural law and applicable to widely separated peoples, and not at all depending upon any communication or correspondence between them. Others applying this theory of similarity of human thought to the evolution of art, principally of ornament, seek to explain every design or pattern, whether historic or prehistoric, savage or civilized, ancient or modern, by declaring that they originally had some occult meaning and that they represented some idea (to us unknown) of the aborigines who invented them. It is declared that if the psychological, including the anthropological, student of the present day could follow these aboriginal designs back to their origin they would find them based on this occult, unknown meaning. Some of these authors, elucidating this proposition, investigate the ornaments of savage or primitive peoples, and seek to demonstrate this occult and unknown thing to have been the origin of all ornament and design. They argue that by the various processes of evolution, the design changing as the idea changed, gradually, step by step, the idea is lost, and nothing remains to represent it but the present unmeaning ornament.

The author, deprecating the tendency to lay down general rules, concedes the possibility of this genesis of ornament in some cases, but declines to accept it as one of the rules. He believes his illustrations of the earliest designs made by man, their great numbers, and their evidently original invention and adoption as ornaments show that the foregoing genesis of ornament is not the rule, whatever its application in particular cases. He denies the correctness of the general proposition of Professor Haddon, especially in its applicability to prehistoric art, "that those who write in the future on decorative art will have to prove that any pattern or design is a purely arbitrary form. That assumption is no longer permissible."[1]

It is always said by the reformers in the psychology of art that their position could be sustained if we could only get back to the beginning of the ornament or to the origin of the art. In the present chapter the author has presented the very beginnings of art. No art can, either in point of time or of civilization, be earlier than that here given. The specimens, in their relation to time, date to the Glacial epoch, and in point of civilization to the Paleolithic period. Nothing that we know of man, not even his existence, is earlier than the art works set forth herein. There was no other beginning to art; there is no relation between this and any preceding period, for so far as relates to art and ornament there was no preceding period. Art begun here; these specimens show the natural or original germ of art in the human mind uninfluenced by anything beyond the necessary environment of life and the inevitable conditions of existence.

So far as can be known, the impulse which moved man in this art

[1] A. C. Haddon: Evolution in Art as Illustrated by the Life Histories of Designs, p. 164.

work was his love of beauty and his desire to gratify it. This love was purely æsthetic and without any utility so far as relates to the engravings on bone, etc., and only partly utilitarian when employed in the beautifying of weapons and implements.

This innate love of ornament has been pushed by some primitive peoples to such extremes as to interfere with the utility of the decorated object, as in the carving of the handles of Mangaian symbolic adzes of the Hervey Islanders; but this belongs to more modern times. We are now dealing with the earlier, the Paleolithic man, with man in the infancy of his race, and we find his ornaments to have been more simple; they had not then run to excess nor interfered with the utility of the decorated object.

These engravings and decorations during the Paleolithic period stand as the foundation or beginning of all art, and we will see how, through the civilization to come after them in the Neolithic and Bronze Ages, these Paleolithic motifs were repeated again and again, how they varied, how they grew, and yet how, down to the end of the prehistoric and the beginning of the historic period, they never got beyond lines or dots, which combined made the parallel lines, the chevron, the herringbone, the zigzag, and similar simple geometric designs. They all grew out of the same beginning and had the same origin. They had no occult meaning; they never stood for any great divinity or power, whether natural or supernatural; they were simply lines and dots arranged in ornamental form to gratify man's innate sense of beauty and because he wished the things he possessed to be beauteous in his eyes.

It is needless to discuss the causes of this natural and innate taste on the part of man. He is born with it, it is part of him, its manifestations afford him pleasure, they gratify his senses, and are to be classed in the same category as the delights of the palate, the beauties of color, and the sweetness of music. He has these tastes, he enjoys their gratification, and he indulges them when he has the opportunity.

Mr. W. J. Stillman, in "Old Rome and the New," says:

> The modern conception of the arts of design is that they are intended as the mirror of nature; the ancient and true one is that they were the outcome of emotion, aspiration, and imagination or spiritual conception of the artist.

These observations may find other illustrations throughout this paper. They might have been postponed to another portion, but they come properly in this place, and the author has deemed wise to insert them here at the conclusion of this chapter, that reference may be made to them in the future reading.

While there have been inventions and duplicate inventions of new designs and reinvention of forgotten ones, yet it is the belief of the author that as a rule the perpetuation of ornamental designs was by imitation and teaching, passing from generation to generation, from parent to child, and from master to servant or slave. Decorative art

forms part of human culture and civilization, and its extension and distribution among men was accomplished in much the same manner as Sir John Lubbock says of the geographical distribution of human races, which, curiously enough, coincides with that of other animals. "There can be no doubt," he says, "that he [man] crept over the earth's surface little by little, year by year, just, for instance, as the weeds of Europe are now gradually but surely creeping over the surface of Australia."[1]

Out of this erroneous theory of the parallelism of human thought has grown that other equally erroneous declaration of the absolute uniformity in man's thoughts and actions, in his aims and methods while he is in the same degree of development, without regard to the country or epoch in which he lived. And this theory has been pushed until it has been said nothing but geographical environment seems to modify the monotonous sameness of man's creations. The theory may be applicable to certain peoples under certain conditions. But it surely has its limitations and is not applicable to individuals. When stated as a rule it does not take into consideration the will, energy, or reasoning powers of man. It leaves out his egoism and his desire for power, improvement, and happiness, which lie at the very foundation of human civilization. The progress of peoples through consecutive stages of civilization is entirely compatible with the author's theory that knowledge of specific objects, the uses of material things, the performance of certain rites, the playing of certain games, the possession of certain myths and traditions, the carrying on of certain industries, were transmitted from one generation to the next, from father to son, mother to daughter, teacher to pupil, boss to apprentice, master to servant or slave; that the future generations improved or were retarded according to their conditions and surroundings, principally their needs, and their relative intellectual faculties and powers of imitation, and that this knowledge passed from one country to another chiefly by the migration, contact, or communication between their peoples. The knowledge of the same things by separated peoples, within reasonable bounds of similarity, increased by complication of machinery and the difficulty of construction, may be treated as reasonable evidence of such migration, contact, or communication.

II. NEOLITHIC PERIOD.

Compared with Paleolithic.

The Neolithic period was first discovered in western Europe, although savages in that culture-status in other parts of the world had been known long before. It, along with the Paleolithic period, is classed as part of the Stone age because the principal cutting implements continued to be made of stone. There were radical differences between these

[1] Sir John Lubbock: Prehistoric Times, pp. 587–601.

two periods; differences in climate, geography, fauna, domesticity of animals, sociology, industry, and art.

In the later epoch of the Paleolithic period the climate was cold and dry, with extreme temperatures, while in the Neolithic period the climate was temperate and uniform.

In the Paleolithic period were living many great animals, now fossil, like the cave bear, the giant beaver, and, most plentiful of all, the mammoth. In the Neolithic period these and others to the number of seventeen, became extinct. Out of forty-eight well ascertained animal species living in France and England during the Paleolithic period, only thirty-one continued into the Neolithic period. Eighteen species of the animals living in the center of Europe associated with man in the Paleolithic period were cold loving. In the Neolithic period, thirteen of them, such as the reindeer, antelope, musk ox, blue fox, and white bear, emigrated to colder countries by latitude, while five, the chamois, marmot, wild goat, and others, have emigrated to colder countries by altitude, going up the mountains.

In the Paleolithic period there were no domestic animals; in the Neolithic period they were abundant.

In the Paleolithic period the population was nomadic; they were hunters and fishers, but not agriculturists; in the Neolithic period the population was sedentary, and agriculture became well developed.

In the Paleolithic period there was practically no pottery in England or France. There are two localities in Belgium where pottery is alleged to have been found. In the Neolithic period pottery was everywhere made and used.

In the Paleolithic period there were no monuments or burials, apparently no respect for the dead, and therefore no evidence of any belief in a future state.

Differences in Art of the Two Periods.

Among these differences the strangest was in the fine arts. In the Paleolithic period we have seen the large number of sculptures and engravings, and that even painting was attempted; how nearly every animal belonging to that epoch, from man down, has been graphically represented in the fine art of that period. On the contrary, in the Neolithic period there are innumerable specimens of decorative art as applied to industry, while we are wholly without graphic delineations of the animals of the period, and no attempt appears to have been made to represent any living thing or to make a representation of nature in any of its forms.

Geometric Ornament.

The art of this period was entirely decorative, and consisted of marks, lines or dots, usually by incision, in geometric form, such as hatch marks, zigzags, herring bone, chevrons, parallel lines, and thumb marks.

These decorations were principally employed in plastic art, and usually for the decoration of pottery. Graphic representation of this decoration shows it to have been similar to that of the Paleolithic period. Yet the likeness is more apparent than real. In Paleolithic times the decoration was, as we have seen, principally by representations of objects taken from nature. The geometric designs were used, and it was therefore correct to show them. Their omission would have been improper. But they were used on few specimens, and on these but sparingly. Harpoons and points of bone were the principal objects of such decoration. Turning back to plates 13, 14, and 15, we will see by these harpoons and points how slight was the opportunity of the paleolithic artist, and we know in how few instances he embraced it. His decorations consisted principally of short marks arranged in parallels and repeated so as to make a pleasing effect.

Not so, however, in Neolithic times. The designs, still geometric, were more complete, were larger, more extended, had greater continuity, and, as before remarked, were used a thousandfold more than in Paleolithic times.

Plates 19 and 20 contain representations of geometric decoration. They are all from western Europe, were taken from actual specimens, and can be identified with the originals. The most of these undoubtedly belong to the Neolithic age, though some may be related to the Bronze age. This is a matter of no consequence, for the Bronze age was but the continuation of the Neolithic age. They are both believed to have been the same race of people throughout western Europe. Some of these decorations were used indiscriminately during both ages.

Flint Chipping.[1]

This art was begun in the Paleolithic and continued throughout the Neolithic period. The fundamental distinction was that in the Neolithic period, after the preparation of flint implements by chipping or battering and pecking, most of them were finished by the secondary process of grinding, and in many cases, polishing. This distinction between these two periods in the art of flint or stone working has not been appreciated by some of our American anthropologists, and has been the foundation of great errors.

Long flakes[1] or blades and livres du beurre of Grand Pressigny, France.

Plate 21 represents one of these livres du beurre. By its side is one of the flakes (Cat. No. 136657, U.S.N.M.), side view, and next to it is another flake represented edge view. If this were an archæological paper instead of being one on fine art, these objects would be fully described, but we are only concerned with the delicate art handiwork of striking off the flakes. This was done with a stone hammer, and

[1] See footnote, p. 355.

EXPLANATION OF PLATE 19.

Fig. 1. Dots slightly prolonged arranged in horizontal parallels, with panels of the same arranged perpendicularly.
Greenwell, British Barrows, page 67, fig. 54.

Fig. 2. Ornamented rim of cinerary urn, parallel lines in relief, with a single row of indentations forming a bead or molding with panel between.
Idem, page 68, fig. 55

Fig. 3. Thumb-nail decoration in parallel horizontal lines.
Idem, page 69, fig. 56.

Fig. 4. Ornamentation by lines of twisted cord arranged in parallels alternately horizontal and vertical.
Idem, page 70, fig. 57.

Fig. 5. Large indentations, crescents, made with the thumb nail.
Idem, page 71, fig. 58.

Fig. 6. Rim decoration of alternate bands of dots and incised lines, with scallops in high relief.
Idem, page 73, fig. 60.

Fig. 7. Zigzag or herring-bone decoration, rows of parallel incised lines.
Idem, page 74, fig. 61.

Fig. 8. Ornamented band for rim of vessel, rolled in high relief, zigzag between two moldings.
Idem, page 72, fig. 59.

Fig. 9. Zigzag or dogtooth decoration, imprint of cord.
Idem, page 75, fig. 62.

Fig. 10. Imprint of cord in horizontal parallel lines.
Idem, page 75, figs. 62, 63, 64.

Fig. 11. Lines of dots in horizontal parallels divided into chevron, dog-tooth, and square forms.
Idem, page 76, fig. 65.

Fig. 12. Decoration of rim of bowl by dots and marks, in parallel lines with dogtooth or Vandyke points formed of incised lines parallel to each other and to the sides of the triangle.
Idem, page 86, fig. 71.

Fig. 13. Lines made by dots with bone point or hard wood, in horizontal bands, divided by perpendicular column into panels forming a square, the center of which left vacant, forms a St. Andrew's cross.
Dawkins, Early Man in Britain, page 361, fig. 127.

Fig. 14. Combination of small herring-bone, dogtooth, and twisted-cord decoration for the rim, and perpendicular lines of short incisions in groups of four or five alternating, covering the body of the vase.
Greenwell, British Barrows, page 88, fig. 73.

Fig. 15. Engraving (intaglio) on support of dolmen of Petit-Mont, Arzon (Morbihan).
De Mortillet, Musée Préhistorique, fig. 581.

Fig. 16. Furrows (intaglio), four or five together in parallel lines, some horizontal and continuous around the vase, others in reversed festoons.
Greenwell, British Barrows, page 89, figs. 75, 76.

Fig. 17. Combination of lines, some incised, others the imprint of a cord, horizontal, perpendicular, and zigzag. Many combinations.
Idem, page 94, fig. 81.

Fig. 18. Pottery stamped in imitation of basket work.

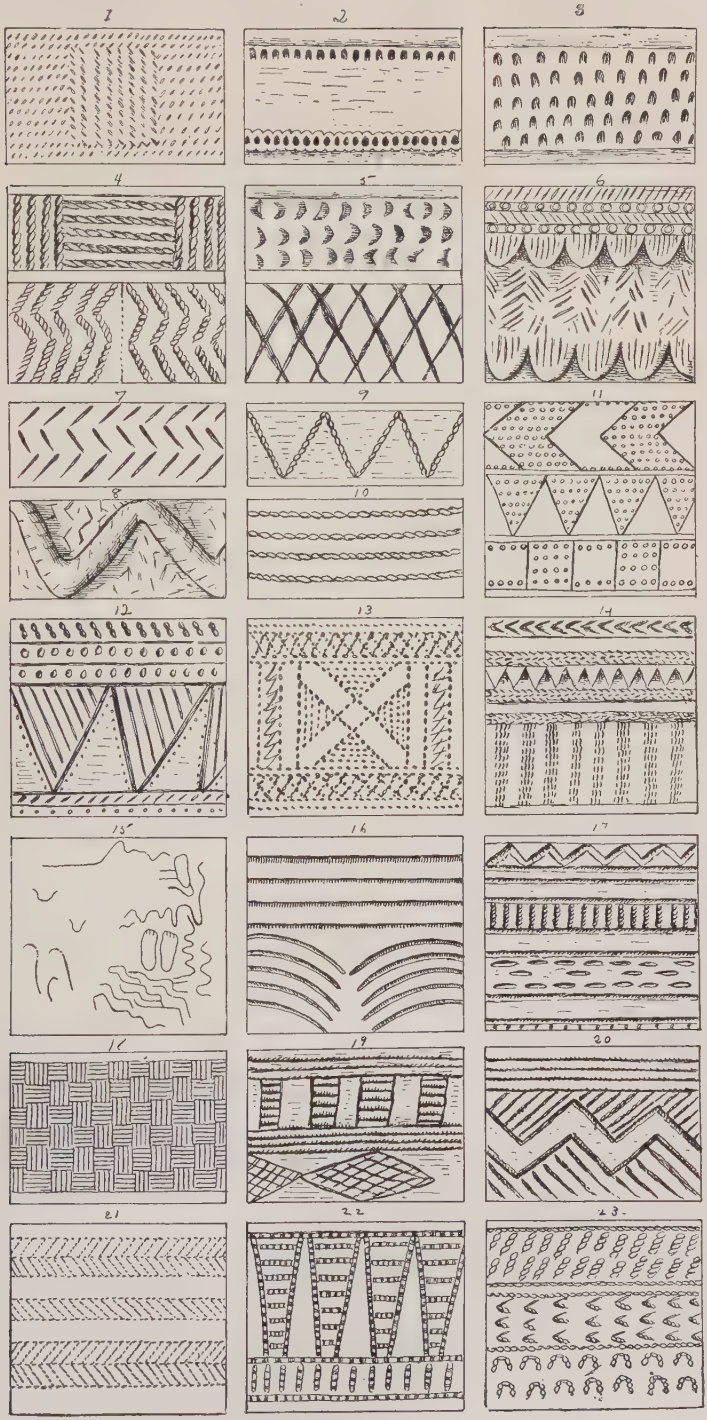
Fig. 19. Ornamentation in combinations of incised lines and cord imprints arranged in horizontal parallel zones and in lozenge form; a center zone broken by parallel panels or bands of smooth surface.
Greenwell, British Barrows, page 101, fig. 89.

Fig. 20. Same specimen as fig. 19, with incised lines and cord imprint in horizontal bands and double zigzag, filled with parallel lines at 45 degrees.
Idem, page 101, fig. 89.

Fig. 21. Small dots in continuous parallel lines at an angle of 45 degrees both ways; arranged in bands or zones of herring-bone pattern. A common form of decoration in Brittany. Vase from dolmen of Portivi, Quiberon. Original, Museum of Vannes.
De Mortillet, Musée Préhistorique, fig. 531.

Fig. 22. Dots slightly prolonged, in parallel lines, forming reversed pyramids, and arranged in bands around the vase.
Greenwell, British Barrows, page 96, fig. 83.

Fig. 23. Imprints of cord showing only three or four twists, applied in different forms, the whole arranged in bands around the vase.
Idem, page 97, fig. 84.



GEOMETRIC DECORATIVE DESIGNS IN USE IN WESTERN EUROPE DURING THE NEOLITHIC PERIOD, SOME OF WHICH WERE CONTINUED INTO THE BRONZE AGE.

EXPLANATION OF PLATE 20.

Fig. 1. Crossed lines of small dots, arranged in bands—one of the common decorations of pottery in Brittany. From a fragment found at the Cromlech of the Isle des Tisserands (Morbihan).
(Original in Musée St. Germain.)

Fig. 2. Scallops made by thumb and finger on rude pottery at or near the edge.
Lake dwelling of Robenhausen, Zurich, Switzerland. (Musée St. Germain.)

Fig. 3. Incised perpendicular lines in groups of five or six, interspaced with small chevrons.
Denmark. After Madsen, plate XLIV, page 44, fig. 11.

Fig. 4. Lines of large dots arranged in zones, alternated with bands of small dots, in parallels at 45 degrees. A single band, also of fine points, arranged in horizontal parallel lines in dogtooth or Vandyke points.
Dolmen of Er-Roh Trinité sur-Mer (Morbihan). (Original, Museum of Vannes.)

Fig. 5. Fine points arranged in bands of Vandyke points, in parallel lines at 45 degrees.
Museum of Vannes. Musée Prehistorique, fig. 536.

Fig. 5½. Coarse pottery rudely ornamented with thumb-nail marks alternated.
(Musée St. Germain. Musée Prehistorique, fig. 534.)

Fig. 6. A different ornamentation on the same specimen as fig. 3.

Fig. 8. Small points arranged in bands and zones, parallel, some of which are in single lines, others wider, wherein the lines of points are parallel at angles of 45 degrees both ways. On same specimen as fig. 4.

Fig. 9. Lines of points close together, horizontal and parallel. Underneath are parallel incised lines, in groups of seven or eight, arranged in festoons, the plain surface above representing Vandyke points.
Monsheim, near Worms. (Museum of Mayence.)

Fig. 10. Cup-markings, single, plain, surrounded by a circle and connected by a line. Covering-stone of dolmen, Baker-hill, Ross-shire, Scotland.
Simpson, Archæic Sculpturings, plate XIV, fig. 1.

Fig. 11. Bands of incised lines, horizontal and parallel, the two upper ones plain, at angle of 45 degrees both ways; lower band of horizontal incised lines, Vandyke points.
Dolmen de Keriaval (Morbihan). (Original, Museum of Vannes. Mortillet, Musée Prehistorique, fig. 541.)

Fig. 12. Waved lines, zigzag, parallel and in bands. Those in the middle are broken at intervals.
Madsen, Antiquities of Denmark, plate XLIII, fig. 2.

Fig. 15. Medium dots alternated with small broken incised lines. The latter arranged in horizontal parallels at the top and middle, indicating the outline of dogtooth ornament between. These are filled with medium dots arranged in horizontal lines; a lower band of three horizontal parallels of medium dots.
(Museum of Zurich. Musée Prehistorique, fig. 538.)

Fig. 16. Ornamentation on same specimen as fig. 12.

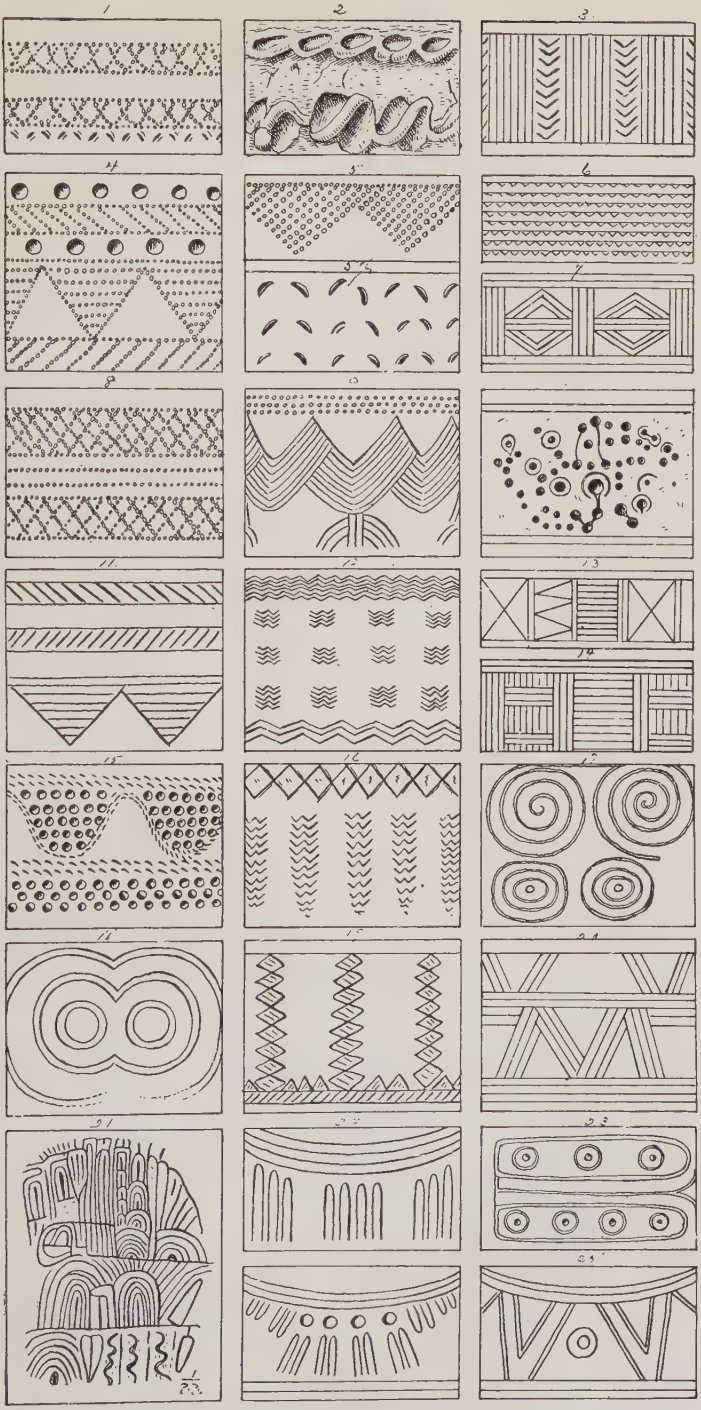
Fig. 17. Spirals and concentric circles cut (intaglio) on a slab of sandstone.
Eday, Orkney, Scotland. (Original, Museum of Society of Antiquities, Edinburgh. Simpson, Archæic Sculpturings, plate XIX, fig. 4.)

Fig. 18. Concentric circles in pairs with interfering and joining lines.
Dolmen d'Availles-sur-Chizé (Deux-Sevres). (Original in Museum of Niort. De Mortillet, Musée Prehistorique, fig. 542.)

Fig. 19. Vandyke point, double, arranged in perpendicular parallel lines with intermediate spaces.
Dolmen, Island of Mœn. (Madsen, Antiquities of Denmark, plate XVI, fig. 5.)

Fig. 21. Ornamentation of many styles, reduced thirty-three times, engraved on one of the supports of the dolmen of Gavr 'Inis.
(Mortillet, Musée Prehistorique, fig. 580.)

Fig. 23. Dots and circles arranged in parallel lines surrounded by incised lines and all inclosed so as to form a cartouch.
Support of the dolmen of Pierres-Plates, Lochmariaquer (Morbihan).

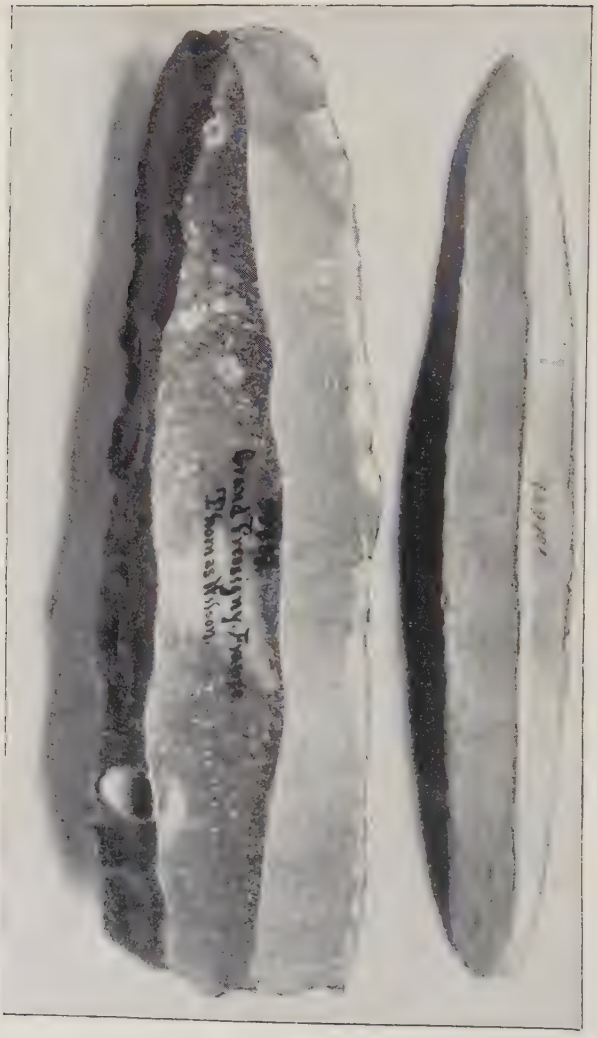


GEOMETRIC DECORATIVE DESIGNS IN USE IN WESTERN EUROPE DURING THE NEOLITHIC PERIOD, SOME OF WHICH WERE CONTINUED INTO THE BRONZE AGE.

NUCLEUS OR CORE OF BEESWAX FLINT.

Flake, side and edge views. Grand Pressigny, France.

Cat. Nos. 136657, 146062, U.S.N.M. $\frac{2}{3}$ natural size.



NUCLEUS AND FLAKE OF BEESWAX FLINT
Grand Pressigny, France.
Cat. Nos. 99889, 136651, U.S.N.M. ½ natural size.

its successful operation required a manual dexterity obtainable only by long practice. It is sufficiently difficult of performance to be ranked among the finer arts. After the preparation of the nodules of flint, so that the blade can be made a sufficient length, with edges smooth and sharp, the upper or top part of the core is struck with the stone hammer (figs. 78*a* and 78*b*) so exact and precise as to the proper point and so delicately gauged as to force, that a single blow knocks off the blade its entire length. There can be no second trial; it is success or failure at the first stroke. Plate 22 represents another of these cores and flakes. The United States National Museum possesses many more of the same kind from the same locality. Anyone who doubts flint chipping being a fine art has but to attempt the operation. He will soon discover that it requires a degree of knowledge and manual dexterity which can be obtained only after many trials. In this it can be favor-

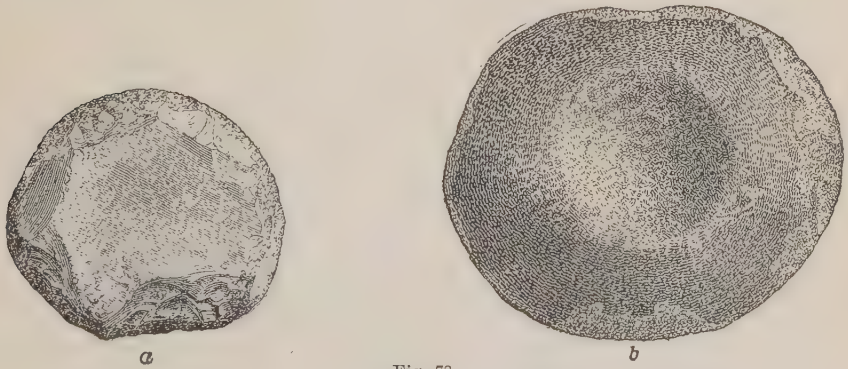


Fig. 78.

HAMMERSTONES.

(*a*) White jaspery flint, Ohio.
Cat. No. 17311, U.S.N.M. ½ natural size.

(*b*) Quartzite, pitted, New York.
Cat. No. 6602, U.S.N.M. ½ natural size.

ably compared to the art of handling the pencil in drawing, the brush in painting, or the chisel in sculpture. It requires even a higher degree of manipulation than either of these. It involves a combination of intellectual understanding derived from a teacher, and a manual dexterity of the hand obtained only by long practice.

The Paleolithic period showed the origin, the very beginning, of art so far as can be determined from our present knowledge of man. The different manifestations of art in the succeeding, the Neolithic, period opens anew the discussion of its origin. A hiatus has been declared between the culture of the two periods, and the differences just described are supposed to represent the renaissance of art in the Neolithic period. Western Europe may have been the cradle of art for the world. The fine art of the Paleolithic period originated there. In the passage to the Neolithic period some branches died out or were lost; new ones were employed, whether invented or

imported is not determined; but certain ones, such as flint chipping and geometric decoration, and possibly others, were continued into the Neolithic period. These latter arts, though forming the principal motifs of the later period, did not originate in it, but in the earlier period, and are to be credited to it.

The advanced culture of the Neolithic period was not indigenous to western Europe. It must have been imported from some country farther east, whence the Neolithic people immigrated when they settled in western Europe. That unknown country may or may not have had earlier relations with Paleolithic culture (for we know that both civilizations spread over that portion of the globe) and in that country the Paleolithic peoples may have taught the Neolithic. But of this we know nothing except what is obtained from the cultural objects themselves, found in western Europe. The art of flint chipping, for example, appears to have been continued from the earlier to the later period without any hiatus, and this could have been done only by teaching, which involves contact and communication between the two ages. This contact in western Europe is denied by most prehistoric anthropologists and the theory of a hiatus between the periods in western Europe is generally accepted, though it has been much weakened. Either the theory of a hiatus must be given up or we must admit contact between the two ages in that unknown Eastern country prior to the migration of the Neolithic peoples to the West. It is easier to believe contact between the two peoples at an earlier period than to believe in a second origin of culture. While certain portions of the cultures of the two peoples have such similarity as to show contact between them, certain other portions have such dissimilarity as to show that the contact was not complete or the communication not perfect. With all the dissimilarities in their culture, it is difficult to believe that the Paleolithic man in western Europe carried away all knowledge of the art of flint chipping or that it was lost (to western Europe) during the hiatus, and that the Neolithic man, on his occupation of that country by migration, reinvented or rediscovered it. The author prefers to believe, as the most reasonable hypothesis, that there had been in some way, unknown though it be, such contact and communication between the two peoples, either before or after their migration, as enabled the later people to learn from the earlier some of their difficult arts, such as the chipping of flint, the making of spearheads, harpoons, and scrapers.

How they came to produce the art of their period is remitted to the same study of psychology required to determine why the man in Paleolithic times should have invented any of the arts. That, we have seen, was because the art objects pleased him. This desire for pleasure was part of the common heritage of mankind, the realization of man's ideal, which we call his good taste. This good taste is involuntary, explainable only by psychology and on a par with the question why does the child like sweets, or why does one child like sweets and another like

sours, or one like music and another not, or like painting, or sculpture, or riches, or science, or literature, or mathematics, or law, theology, medicine, banking, business, war, etc. All we know is that on these subjects (and many others) mankind has an ideal which for the time creates his standard and forms his taste; in time man, through study and contemplation, finds his old ideal fall short of his expectations and he becomes dissatisfied with it; by study and contemplation he conjures a new ideal; a new ideal in art establishes a new standard of taste, and by this he tests his new effort. The argument of condition or environment usually applicable to man's industry and sociology has slight application to his art. His art is for his pleasure, not for his necessity; therefore, the foregoing statement relates only to art objects and not to those of utility. The evolution of utilitarian objects as distinguished from art objects is governed by man's needs, but he has no need, or but little need, for art objects. They are solely for his pleasure, and their evolution or change is only to gratify his changed ideal or standard of taste.

The primary and principal implement required for this art work is the hammer (fig. 78 *a*, *b*), by which the blow is struck and the flake or chip knocked off. Rude pieces of hard stone, usually flint, quartz, or quartzite, were used for hammers, their sharp corners serving to increase the precision of the blow. When their corners were worn away so that an accurate blow could not be given they were doubtless cast away or used for other purposes. Practically there is no difference between the stone hammers of different countries in the two ages of Stone.

The successful manipulation of the operation of flint chipping as performed by prehistoric man entitles it to be classed among the fine arts, and requires a few sentences of description. As to material, flint best answers the requirements. It should be homogeneous in substance and crystalline or cryptocrystalline in formation. When properly treated it can be struck off into long flakes or blades, producing a keen, smooth edge much the same as slivers of broken glass. The nodules of flint having been prepared, the art of the operation consists in judging the force of the blow and determining accurately the point of impact; then follows the successful manipulation in carrying out this good judgment. In justification of the claim that this is fine art it can be said that no historic or modern individual has ever attained the success acquired by the artist of prehistoric times.

During the progress of this paper the author has received letters from different parts of the United States giving currency to the report that it was the belief of scientists that the art of flint chipping was a lost art, and that the Smithsonian Institution had offered a reward or bonus to anyone who should make the discovery of how it was done. This report is entirely without foundation. The art of flint chipping, so far as it applies to the small flint or glass arrowheads, or the chipping of these materials, is well known and is or has been practiced by

many persons in the United States. A gentleman from Connecticut has sent us a series of small glass arrowheads made by himself. A clergyman from Oregon makes of the mottled jasper-like obsidian beautiful specimens of small arrowheads called jewel points, mounted and sold for use as pins for personal decoration. He makes no pretense of secrecy nor that they are other than his own manufacture, and he sells them as specimens of his art.

Several persons in various parts of the United States, whose names as well as their work are well known, either make new or alter old or broken arrowheads, and they have been known to sell them as genuine. Thus doctored they belong to the class of arrowheads denominated Division IV, Class I. These have been figured and described by the

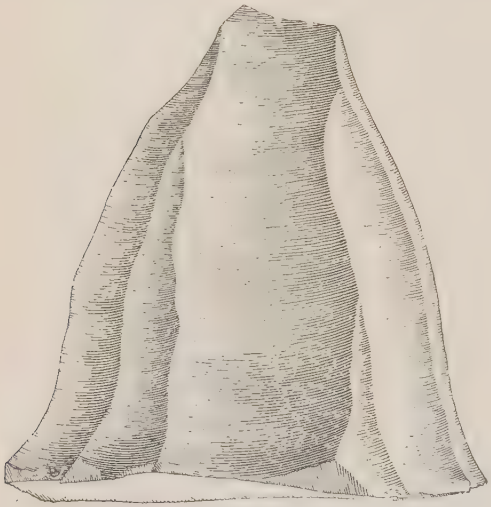


Fig. 79.

Fig. 80.

Figs. 79 and 80.

CORE OF BLACK FLINT AND FLAKES STRICKEN FROM THE SAME.

Brandon, England.

Cat. No. 139182, U.S.N.M. $\frac{2}{3}$ natural size.

author[1] and the public warned against them, which warning seems to have been acted upon by both makers and purchasers, and the industry in that part of the country has practically died out. It is continued in Oregon.

But this industry is confined to comparatively small arrowheads. The large leaf-shaped implements and similar objects made by chipping, which are thin in comparison to their width, made by striking off fine and long flakes reaching to or beyond the center of the implement, leaving the edges keen and sharp, have never been reproduced. Such implements as are represented in figs. 86 to 95, from the United States, and the large ones in plates 9 and 10, from Europe, have never been made in modern times or by modern workmen.

[1] American Naturalist, XXII, p. 555, June, 1888.

BRANDON CORE.

Fig. 79 represents a core of flint from Brandon, England. The flakes (fig. 80) have been struck off, one after the other, going around the outer edge, gauging the proper thickness for the flake, the inside of one forming the outside of the next. With patience one can rearrange the flakes one by one against the core in the inverse order in which they have been struck off until the nodule is reconstructed. The core shows the conchoidal fracture made by each blow, and with the aid of this peculiarity the flakes can be fitted one to the other, as shown in fig. 80. The same operation is performed in making the cores and flakes of obsidian, to be shown further on (Plate 26).

Conchoidal fracture.—The conchoidal fracture is the evidence of a blow. Every blow which produces a fracture in the flint leaves such a conchoidal figure. By it the early discoveries of the existence of prehistoric man were made, and human intervention in manufactured objects rendered certain. Fig. 81 represents one of these Brandon flint cores with its flakes all in place, showing how they were struck off, one after the other.

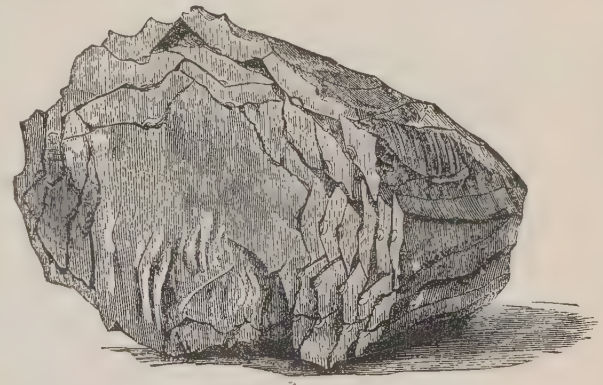


Fig. 81.

CORE OF BLACK FLINT, WITH ITS BLADES AS STRUCK OFF ARRANGED IN PLACE.

Evans, Ancient Stone Implements of Great Britain, fig. 2.

Most of the works on prehistoric archæology relating to the making of arrowheads refer to such stone chipping among modern savages, and many of them contain descriptions by travelers and visitors of the different tools and methods by which flint chipping was done.[1] As we are dealing with prehistoric fine art rather than prehistoric archæology or primitive industry, we need not further pursue the subject of how to chip flint.

BONE FLAKERS.

While stone hammers similar to fig. 78 were, as already mentioned, the principal tool with which flint chipping was done, yet other implements were used. The Eskimo has points of bone or horn called flakers, with which, it is said, he pushes or presses off the smaller flakes.

[1] Sir John Evans, Ancient Stone Implements of Great Britain; Wilde's Catalogue of Antiquities of the Royal Irish Academy; De Mortillet's La Prehistorique; Stephens's Flint Chips.

Sir John Evans[1] shows representations of these flakers. Capt. John Smith, writing in 1606 of the Indians of Virginia, says: "His arrowhead he maketh quickly with a little bone, which he ever weareth at his bracer." Sir John Evans[2] says:

> No sculptor ever handled a chisel with greater precision or more carefully measured the weight and effect of every blow than did this ingenious Indian; for even among them arrow making was a distinct profession in which few attained excellence.

SCANDINAVIAN FLINT CHIPPING.

Scandinavia stands at the head of prehistoric European countries for excellence in flint chipping during Neolithic times. The specimens from that country stand as models of such art work.

Daggers.—Plate 23 represents a dagger or poniard of flint from Copenhagen. Its length is $8\frac{3}{4}$ inches, width of blade $2\frac{1}{2}$ inches, and thickness of blade $\frac{1}{2}$ inch. The implement has been made entirely by chipping, the blade in its finishing has been flaked always from the edge, forming a perceptible ridge in the center. The smallness and thinness of the flakes may be imagined from the regularity and smoothness of the edge. Plate 24 represents other specimens of flint from Scandinavia—poniards or daggers. They are of the flint of the country, and the chipping thereof is of the same style and exhibits the same high degree of manual dexterity as the specimen in plate 23. The chipping of the handle of specimen No. 191644, U.S.N.M., is to be noted. It shows how by artistic treatment different effects can be produced.

MEXICO.

Leaf-shaped, Class A.—The Solutréen leaf-shaped implements have already been described and figured (Plate 9). They belong to the Paleolithic period, but the same kind of object, of equally fine art and difficulty of fabrication, was made in the Neolithic period.[3] This applies equally to America as to Europe. Plate 25 represents these implements from Mexico. They are of the same general type as the Solutréen leaf-shaped implements which forms Class A of the leaf-shaped division in my "Classification of Arrow and Spear Heads." They are shaped like a laurel leaf, are elliptical and pointed at both ends. Their widest place is one-third or one-fourth the distance from the base. The specimen on plate 25 is from Oaxaca, Mexico, and is $12\frac{1}{2}$ inches in length, $3\frac{3}{4}$ inches in width, and $\frac{3}{4}$ inch in thickness.

THE UNITED STATES OF AMERICA.

Leaf-shaped, Class A.—Plate 26 presents a remarkable specimen of stone chipping. It was found, May 20, 1891, on the farm of and is owned by Mr. G. F. Arvedson, of Carpentersville, Illinois. The material is quartzite, which increases its interest, as quartzite is more

[1] Ancient Stone Implements of Great Britain, p. 35, figs. 9 and 10.

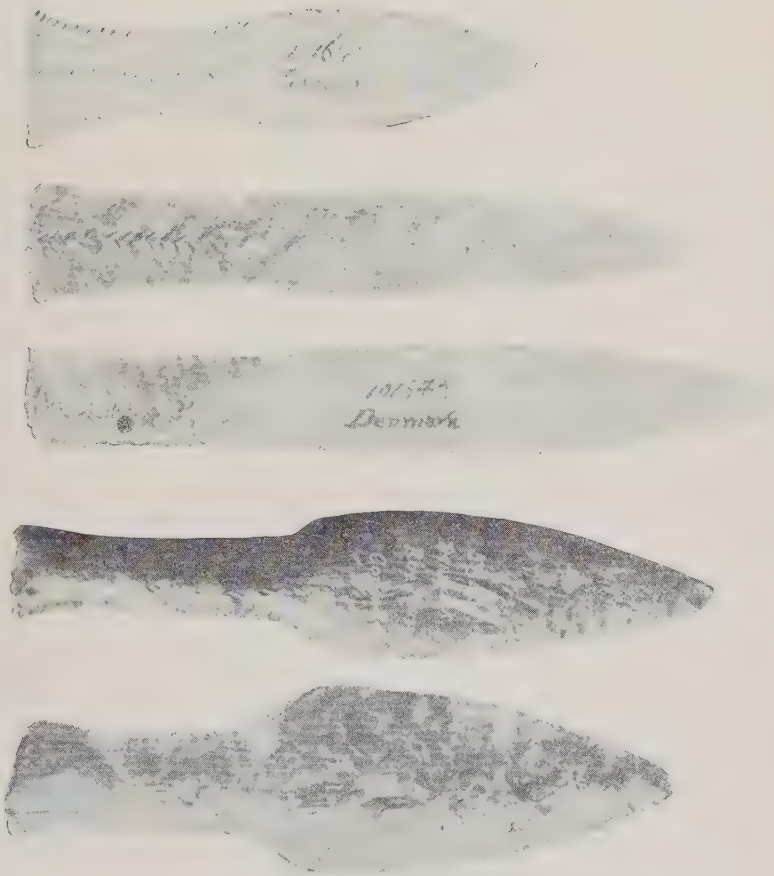
[2] *Idem*, p. 36.

[3] See p. 422.

PONIARD OF FLINT, FINELY CHIPPED.

Scandinavia.

Collection of Rev. Dr. Nevin, Rome. $\frac{1}{3}$ natural size



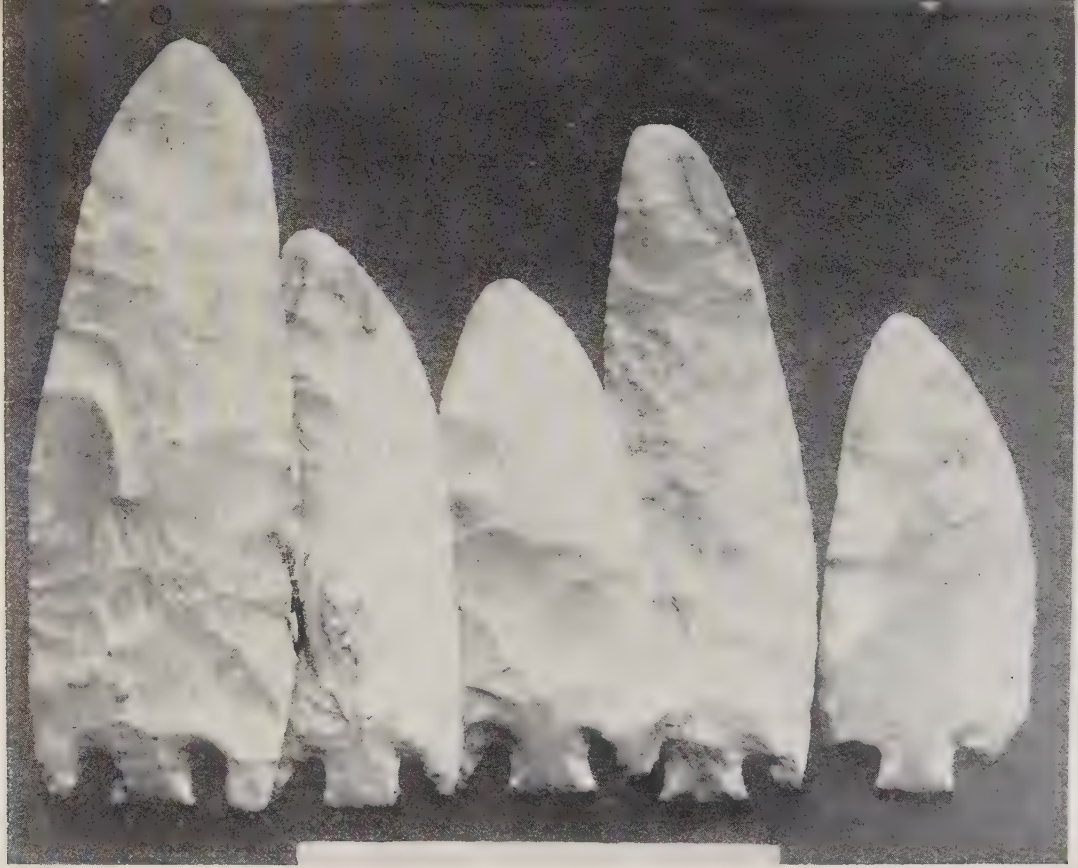
POINIARDS OR DAGGERS OF FLINT. FINELY CHIPPED.

Scandinavia.

Cat. Nos. 101644-45, 58485, 77, U S N M.

LEAF-SHAPED IMPLEMENT, WHITE FLINT OR CHALCEDONY.
Oaxaca, Mexico.
Douglas collection. $\frac{7}{8}$ natural size.

LARGE QUARTZITE BLADE, FINELY CHIPPED.
Arvedson collection, Carpentersville, Illinois. $\frac{5}{12}$ natural size.



FIVE LARGE SPEARHEADS, CHALCEDONY.
Little Missouri River, Pike County, Arkansas.
Cat. No. 150176, U.S.N.M. $\frac{2}{3}$ natural size.

refractory and difficult to chip than flint. The remarkable characteristic of this implement is that, being of this material, it should be so large. Its dimensions are $14\frac{7}{8}$ inches long, $2\frac{7}{8}$ inches wide. Its exact thickness is not known, but supposed to be $\frac{3}{8}$ or $\frac{1}{2}$ inch. The flakes, which are struck, by which it was reduced to its present appearance, are extremely broad, some of them $1\frac{1}{4}$ inches, many of them $\frac{3}{4}$ inch, and correspondingly thin. They have been struck from the edges on both sides and approach the center, leaving a slight ridge. The point is sharp, the edges sharp and symmetrical, while the base finishes with a slight stem. The dexterity shown in the chipping of this instrument is worthy of all praise. With the proper material such an implement might be made in a very short time if the artist who made it was skillful, but it undoubtedly required a vast deal of practice to enable him to perform the work at all. This specimen is a satisfactory example of the ability of the prehistoric artist to perform any work of this kind, however difficult. It shows his perfect control over his material and his ability to work it according to any style and in any way or to any shape that his fancy might dictate.

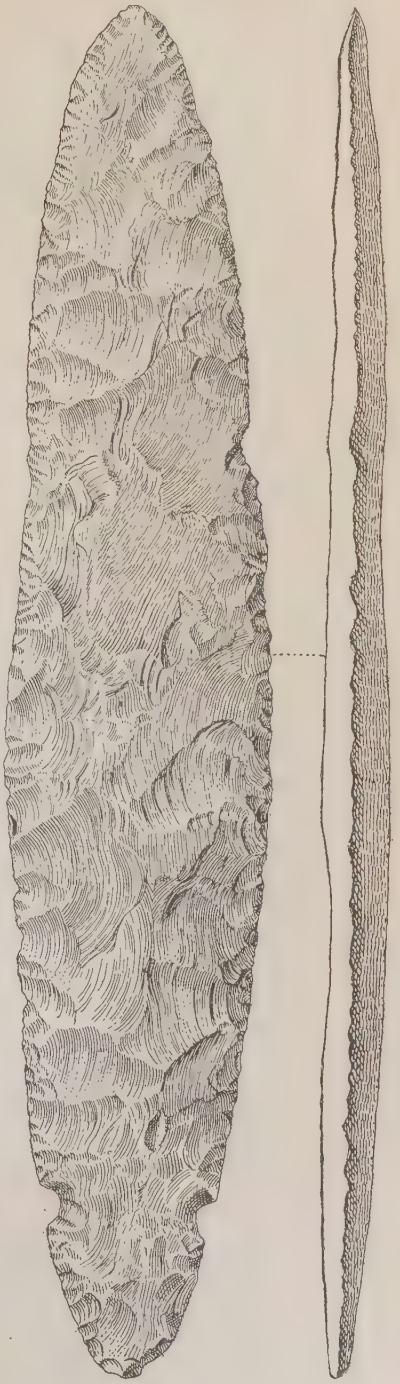


Fig. 82.

LEAF-SHAPED FLINT IMPLEMENT.

Gilmer County, Georgia.

Found by H. M. Ellington. Cat. No. 89928, U.S.N.M. $\frac{2}{3}$ natural size.

Plate 27 represents five specimens out of a cache of fourteen, found on the banks of the Little Missouri River, Pike County, Arkansas. These are introduced as specimens of the art

of flaking, showing, as they do, the large flakes struck off by a blow, with the conchoid of percussion, and the smaller ones without the conchoid, made by pressure. They are of milk-white chalcedony, and are from 11 inches in length down.

Fig. 82 represents a leaf-shaped implement 9½ inches long, from Gilmer County, Georgia. It was found by Mr. H. M. Ellington while dig-

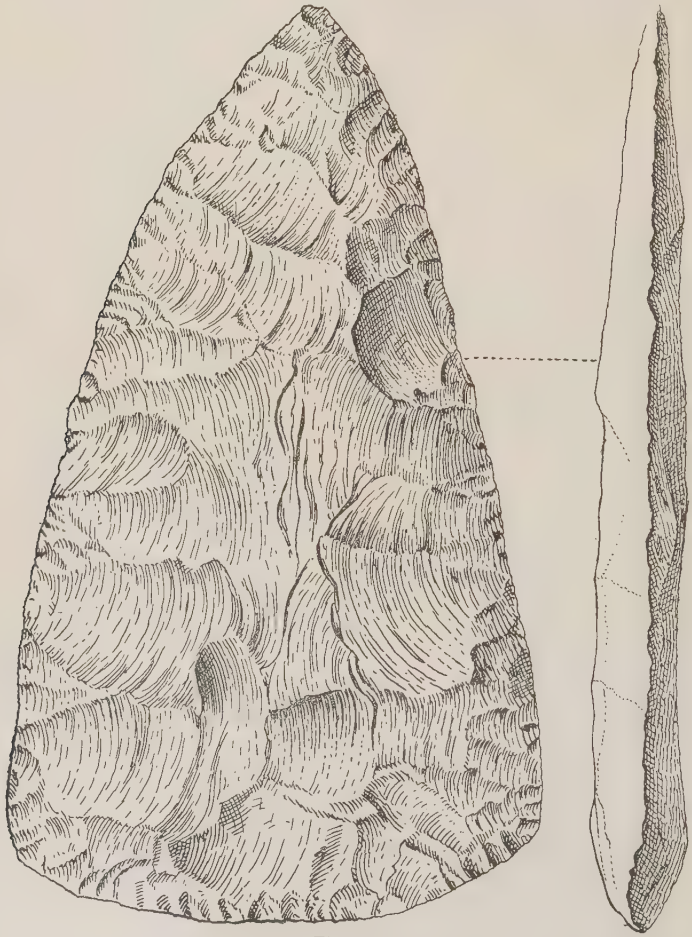


Fig. 83.

LEAF-SHAPED IMPLEMENT OF WHITE FLINT, BEAUTIFULLY WROUGHT.

Columbia County, Georgia.

Steiner Collection. Cat. No. 172559, U.S.N.M. Natural size.

ging in a prehistoric grave, 3 feet beneath the surface. No opinion is expressed with regard to its function, and no consideration is given to the peculiarity of its leaf-shaped form nor to the two notches near one end. It is to be remarked, however, that the proportion between the width and thickness, which made its appearance in the Solutréen epoch, is maintained in this specimen as it is in all those belonging to the Neolithic period. This notable difference between these and the Chelléen

implements is continually to be kept in view. The material of this specimen is not flint, is light reddish in color, comes from a ledge and not from a nodule, is coarse grained and refractory, is not homogeneous, and does not break with a regular or conchoidal fracture. But with these disadvantages, apparently insuperable to a modern archæologist, the ancient artist was able by his skill to produce as fine a specimen of art work as is here presented. But for its material and the two small notches in one end it might pass for one of the leaf-shaped implements of the Solutréen period from western Europe.

Fig. 83 represents a beautiful implement of nearly white flint, covered with a noticeable patina and wrought in accordance with the exigencies of high art in flint chipping. It belongs to the Steiner collection, and comes from Columbia County, Georgia. It greatly resembles and compares favorably with a specimen from Casa de Moura, Portugal, figured by Cartailhac,[1] as a notably beautiful specimen of art work.

Fig. 84 represents a fine-art spearhead from La Paz, Lower California, collected by Mr. James Viosca, consul, sent to the National Museum through Mr. L. Belding. It is not leaf shaped, but has a stem. Its appearance indicates that the maker was an artist in

Fig. 84.
SPEARHEAD, CHERTY FLINT.
La Paz, Lower California.
Cat. No. 61407, U.S.N.M. Natural size.

[1] Prehistorique de l'Espagne.

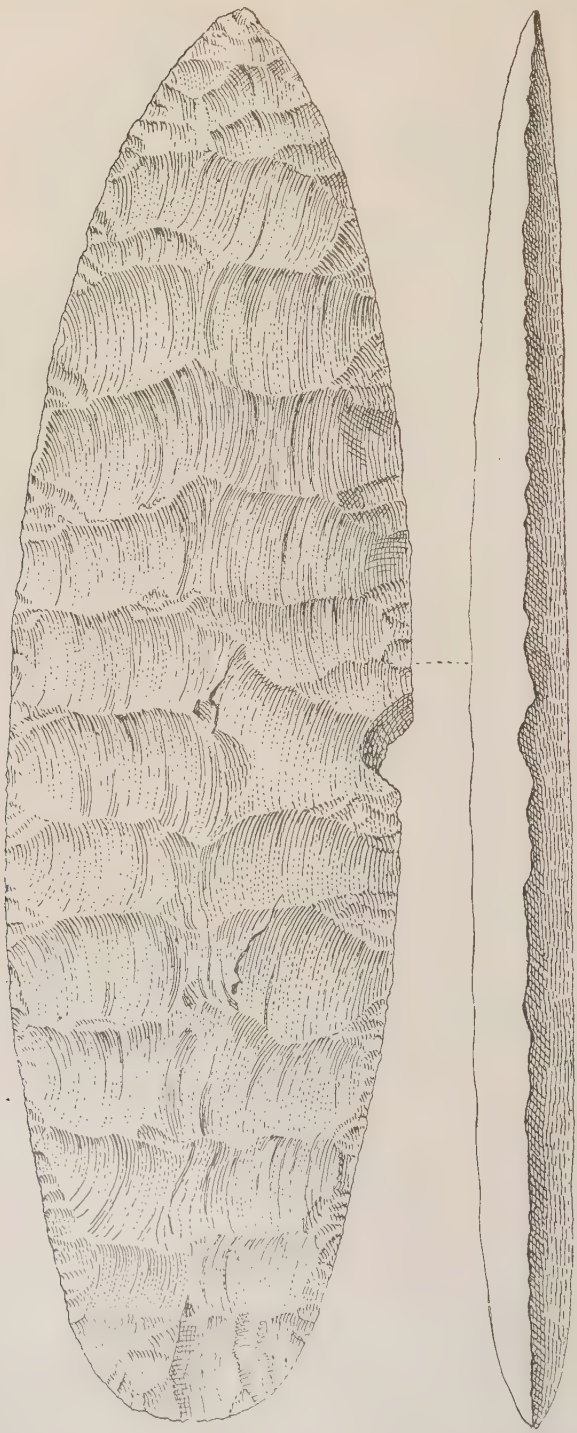


Fig. 85.

LEAF-SHAPED IMPLEMENT, CHERT (NODULE).

Naples, Illinois.

Fine specimen of [illegible] flipping; the flakes are broad, thin, and regular. Cat. No. 43133, U.S.N.M. Natural size.

flint chipping. Its length is $6\frac{3}{4}$ inches, width $2\frac{1}{2}$ inches, thickness $\frac{5}{16}$ inch.

Fig. 85 is from a mound near Naples, Illinois, collected by Col. J. G. Henderson. It is of the brown pyromachic flint. It is one of the superior specimens of art in flint chipping; it is leaf shaped, though one end is rounded while the other is pointed; is $7\frac{1}{4}$ inches in length, $2\frac{1}{8}$ inches in width, and $\frac{1}{2}$ inch in thickness. There are few specimens to be seen better representing fine art in flint chipping than does this. The artist who made it manifests his ability at every step. He shows that he can embody any design of fantasy or improvisation in the way of flint chipping which his imagination suggested. This art work is not simply the chipping of flint by which the object is reduced in its proportions to a given standard, but the artist has been able to accomplish that end by chipping the flint in any way he desired. It is not in the making of a single flake that he shows his excellence, but rather that he should have been able to repeat them with exactitude as many times as he might wish. The flakes have been stricken from each edge toward the center. This has made the flakes to be about an inch long. There are about eleven of them in 6 inches of space, making each one slightly over half an inch wide. They are extremely thin, one might say "as thin as paper," but they are really about as thick as a sheet of tin. So we have flakes an inch long, half an inch wide, and thin as tin sheets, that have been struck off consecutively, each one exactly like the other, to the number of forty-four, without a single miss-stroke or failure.

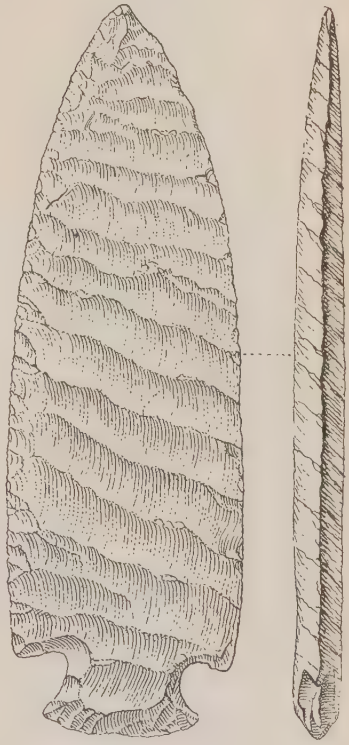


Fig. 86.

SPEARHEAD, STEMMED, SHOULDERED, AND BARBED, CLASS C.

Naples, Illinois.

The finest piece of flint chipping in the Museum. Cat. No. 43133, U.S.N.M. Natural size.

The foregoing specimen of fine art is worthy all praise for its excellence in flint chipping, but the next (fig. 86) is a finer specimen of art, more difficult to make, and worthy a higher admiration. It comes from the same mound as did the former and was collected by the same gentleman. It is not so large, being only $3\frac{7}{8}$ inches long, $1\frac{1}{4}$ wide, and $\frac{1}{4}$ inch thick. It is of the same brown pyromachic flint as the former, but has a finer patina. The chipping being described, its excellence

will be apparent. Instead of the flakes being struck from each edge toward the center, as in almost every other specimen, all of them were struck from one edge and went clear across the rounded side to the other edge. As in the case of the former (fig. 85), it is not the single flake that excites our admiration, but that it should have been repeated with precision and exactitude from one end of the implement to the other and on both sides. These flakes are about $1\frac{3}{8}$ inches in length, $\frac{1}{4}$ inch in width, and about as thick as parchment. Fifteen of these flakes have been struck from each side of this implement—thirty in all. As in fig. 85, the artist has repeated these flakes with precision, difficult as it was, throughout the entire work. Not only was each flake like every other, but the group of flakes on one side of the implement correspond to the group of flakes on the other side.

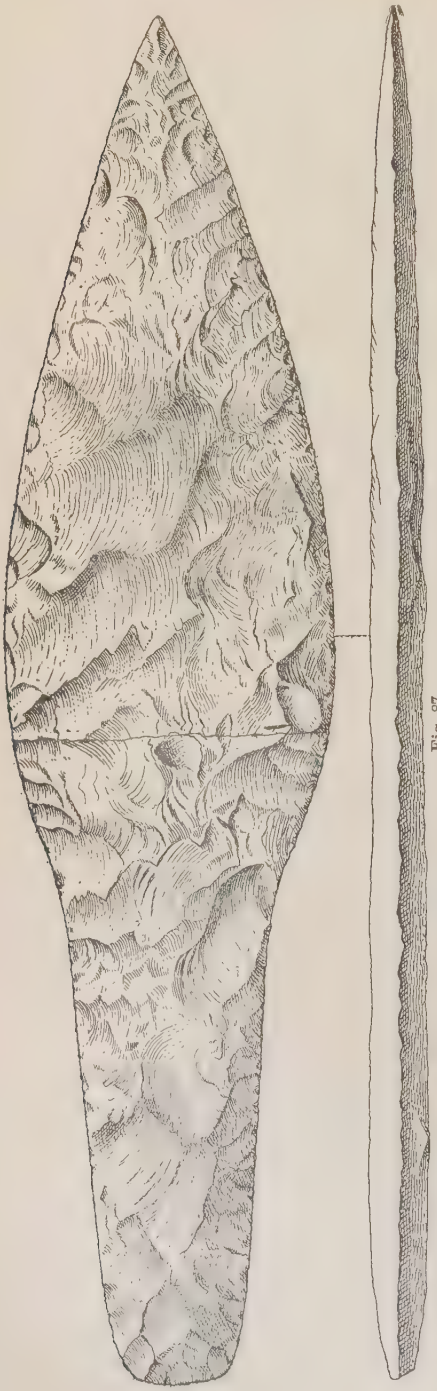
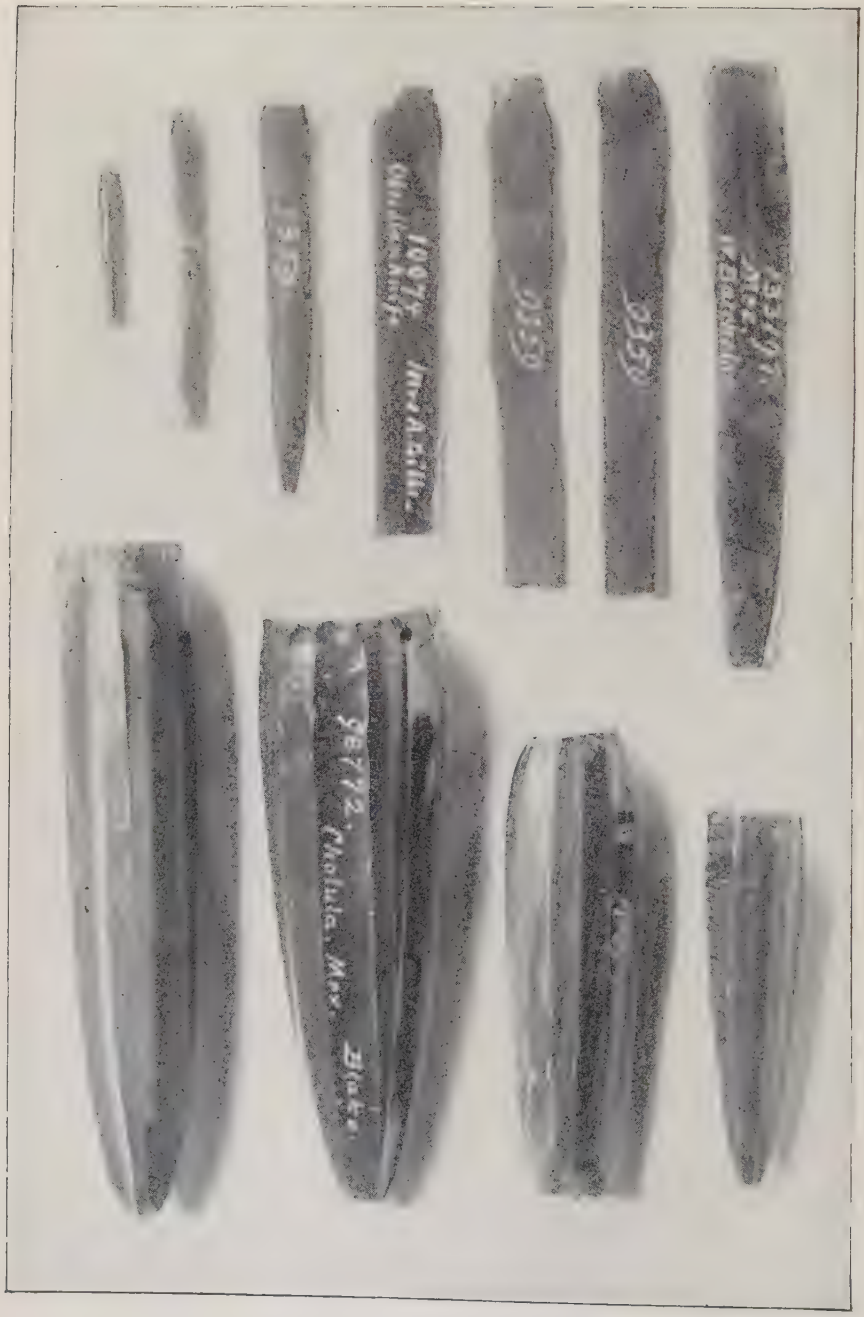


Fig. 87.
PONIARD OR DAGGER OF WHITE FLINT, FINELY CHIPPED.
Pike County, Illinois.
Cat. No. 32831, U.S.N.M. $\frac{7}{16}$ natural size.

Reference is made to the dagger or poniard of flint from Copenhagen (Plate 22) as a particularly fine specimen of flint chipping from Scandinavia. Fig. 87 represents a similar implement from the United States, which, though not so good, is submitted for comparison. It is of the white flint, or rather chert with pink patina, from



OBSIDIAN CORES AND FLAKES FROM MEXICO AND CALIFORNIA.
Cat. Nos. (see specimens), U.S.N.M. ⅔ natural size.

Pike County, Illinois, and was found by Mr. Brainard Mitchel. Its length is 10¼ inches.

Obsidian.—The art of chipping required such material as was homogeneous and would break with a clear fracture. All that did so broke with a conchoid. Obsidian possessed these qualifications. It broke with a sharp, smooth edge and a clear fracture, and was, with flint, a favorite with the prehistoric stone-chipping artist. The United States National Museum possesses hundreds of cores or nuclei of obsidian and thousands of flakes which have been struck therefrom. The cores are 6 or 7 inches in length and under. Some have had flakes struck off all round, and others only part way. These flakes have all been knocked off by a blow at the top, each blow making a flake. There are as many as sixteen flakes which have been struck from a single core, and this has been repeated in lesser numbers among many cores. The difficulty of this work and the art displayed in its performance is manifested by the fact that the artist was able to reproduce these cores and flakes in the large and indefinite numbers suggested. He seemed to be able to determine the size and weight of his hammer and manipulate the blow with sufficient force and accuracy to repeat the result any number of times, producing at his pleasure hundreds or thousands of specimens practically alike. Plate 28 represents selections of these cores and flakes. These particular specimens are from Mexico, but similar ones have been found throughout the Rocky Mountain region of the United States and on the Pacific Coast, and are not uncommon in every part of the world where this material is obtainable. The island of Crete is notable for the number of these objects, though they are all small. Fig. 88 represents a large hooked implement of obsidian from Tepoxtlan, Mexico.

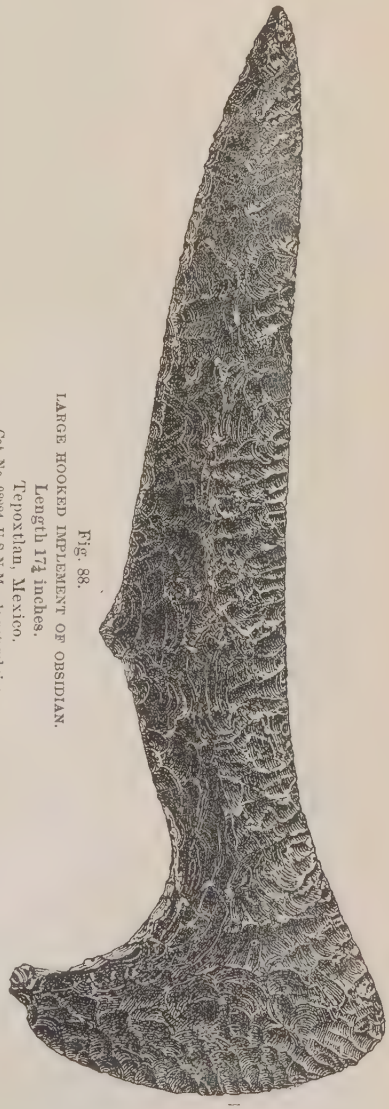


Fig. 88.

LARGE HOOKED IMPLEMENT OF OBSIDIAN.

Length 17¼ inches.

Tepoxtlan, Mexico.

Cat. No. 98894, U.S.N.M. ⅓ natural size.

Its length is $17\frac{1}{4}$ inches, width $2\frac{1}{2}$, and its thickness $\frac{3}{8}$ inch. It maintains the same high standard of flint chipping as shown in most of the other specimens. Its art work is well shown in the figure.

Fig. 89 represents an obsidian blade of large size, which, for want of a better name, has been called a sword. Its length is 15 inches, width $2\frac{3}{8}$, and thickness $\frac{5}{8}$ inch, and is from a mound in Oregon. It is an example of fine and delicate chipping, which does credit to its maker as an artist of the first-class.

Fig. 89. OBSIDIAN BLADE (SWORD?). Oregon. Cat. No. 30190, U.S.N.M. ½ natural size.

Fig. 90 is a beautiful specimen of rose quartzite. Its fine grain alone rendered its manufacture possible. Quartzite is a refractory material, and it would have been a testimonial to the ability of the artist had he made an implement, without regard to its elegance or symmetry. However, he has succeeded admirably in these points, for the implement is nearly perfect in both regards. The flakes by which it was reduced were extremely small, and the work proceeded little by little. The artist must have used the greatest care. No owner of this beautiful specimen would risk a single blow upon it such as must have been given a hundred or more times in the course of its manufacture.

Figs. 91 and 92 are other specimens of flint chipping, maintaining the standard for excellence in this art. The former is from Groveport, Ohio, and was collected by Mr. W. R. Limpert. The latter is also from Ohio, collected by Prof. W. K. Moorehead.

Curious forms.—Fig. 93, *a*, *b*, *c*, *d*, represent four arrowheads, introduced because of peculiarities in the fineness of their flint chipping. Fig. 93*a* is one of gray lustrous flint, approaching chalcedony. It belongs to Division IV, Peculiar forms, Class H, Asymmetric. This specimen, as is the next, is extremely thin, neither of them being much more than one-eighth of an inch in thickness. It comes from Santa Barbara, California, and is one of four collected by Prof. David S. Jordan. Fig. 93*b*, also from California, is of rock crystal and is the thinnest specimen of its kind in the Museum. The chips or flakes broken from these two specimens have been extremely fine and thin, leaving the edges and points smooth and even, while keen and sharp. Fig. 93*c*, also asymmetric, is of gray flint, and from Chicago. Its finder was Mr. Carl Dilg, and he has named this specimen the "Riverside arrow." Fig. 93*d* is presented

TWENTY FLINT OBJECTS OF CURIOUS FORM, NONE UTILITARIAN.
Cat. Nos. (see specimens), U.S.N.M. ½ natural size.

because of the extreme fineness of the point and the thinness of the implement. It comes from San Marcos, Texas, and was collected by Mr. H. von Beyer. It is the yellow beeswax flint common to that country.

It has been remarked many times throughout this paper that the prehistoric artist possessed sufficient confidence in his ability, and displayed such control over his tools and materials as enabled him to make anything out of flint that his fancy might dictate; he did not confine himself to utilitarian objects, but was an artist in the true sense of the word; that is to say, he dealt with art for art's sake, for the sake of making something which should be beautiful and whose only purpose, according to the canon of art laid down by Sir John Collier, would be to please his eye and to gratify his taste. The prehistoric artist in flint obtained, in some way, we know not how, possibly by study and contemplation, possibly by education, possibly by accident, an ideal which he reproduced in flint. Plate 29 represents twenty objects taken at hazard from the interior of the United States, principally from the Ohio and Mississippi valleys, all of flint, in curious and rare forms, believed to be entirely without utility and solely to gratify an artistic desire. None of them are arrow or spear heads, and none of them appear to have been made for any service. They are the work of a master who, conscious of his ability, is playing with his art. One represents a bird, one a snake, one an outstretched beaver skin, two of

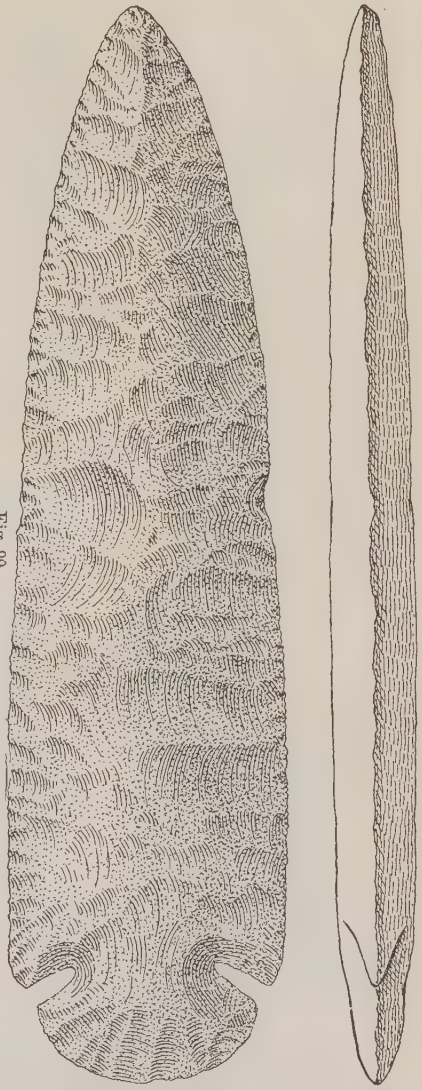


Fig. 90.

SPEARHEAD, STEMMED, SHOULDERED, AND BARBED, CLASS C.

This beautiful specimen is of rose quartzite, more refractory than flint.

Cat. No. 13797, U.S.N.M. Natural size.

them, by stretch of the imagination, might represent four-footed animals; the rest have no likeness to any known object. All of them are worked from flint or some similar stone; one is of obsidian; they are represented about natural size. This series, with fig. 93, shows what the prehistoric artist in flint was able to do in the management and control of his tools and materials in making fanciful objects.

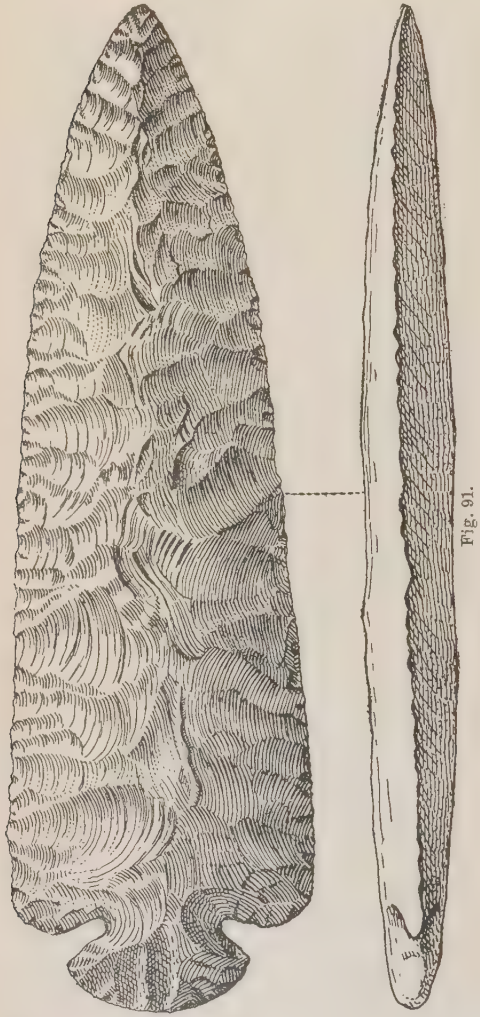


Fig. 91.
SPEARHEAD OF CHALEDONIC FLINT.
Side and edge views.
Groveport, Ohio.
Cat. No. 7659, U.S.N.M. Natural size.

The foregoing specimens are small, and, consequently, might be considered as toys or playthings and of no value to the prehistoric artist, yet it would be an error to predicate a theory upon this, for there have been others equally trivial and apparently of as little utility which bear evidence of fine art work and yet are of large size. Fig. 94 represents one of a series of these large flint implements chipped into fanciful form. This particular one is from Humphreys County, Tennessee, and was collected by Mr. Edward W. Hicks. It is $11\frac{1}{4}$ inches in length and $4\frac{1}{2}$ inches in width. Other specimens of similar workmanship, but of different though of equally fanciful form, have been found in the same as well as other localities. Gen. Gates P. Thruston[1] has described these at length.

[1] Antiquities of Tennessee, pp. 230–252.

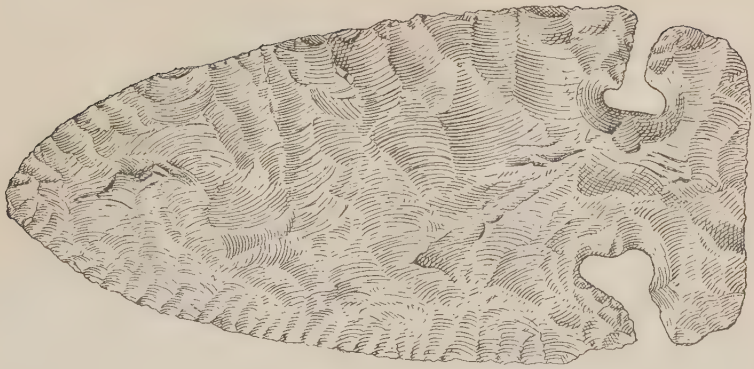


Fig. 92.

SPEARHEAD, STEMMED, SHOULDERED, AND BARBED, CLASS C.

White and rose flint.

Ohio.

W. K. Moorehead. Cat. No. 172831, U.S.N.M. Natural size.

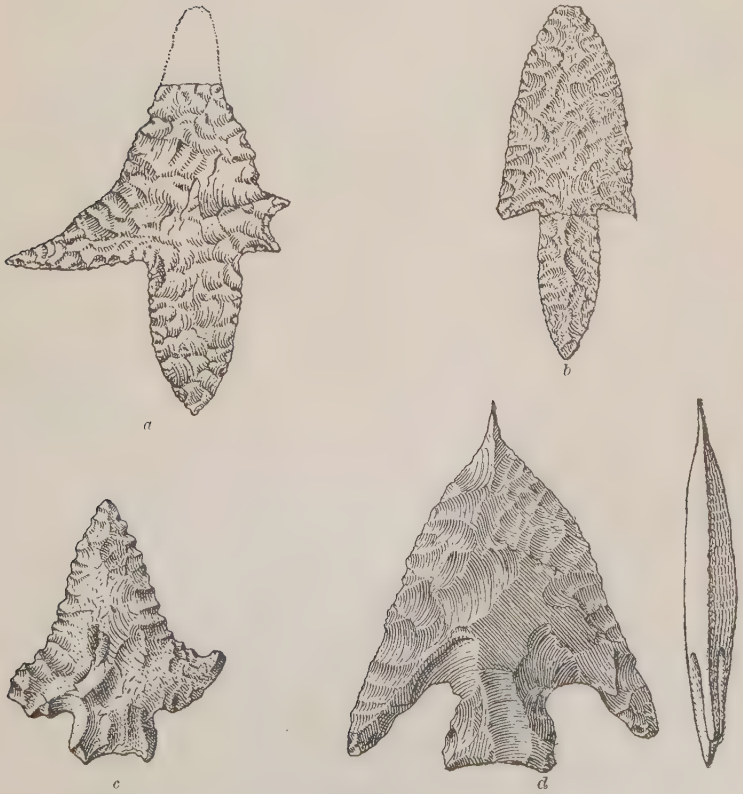


Fig. 93.

FOUR ARROWHEADS OF FLINT FINELY CHIPPED, WITH SHARP EDGES AND FINE POINTS.

Cat. Nos. 43060, 149373, 3287, U.S.N.M. Natural size.

Polished Stone Hatchets.

While the chipping of stone continued throughout the Neolithic, as it had in the Paleolithic period, there was added to it a newly discovered art by which the implement might be made smooth and sharp. This discovery was the grinding or polishing of stone implements and bringing out the beauty of their form and symmetry, showing with truth and accuracy the fine lines upon which they had been wrought, and adapting them to utilitarian objects, tools, and weapons.

The characteristic implements of the Neolithic period are the polished stone hatchets. They are found practically all over the world, showing that the Neolithic civilization must have comprised an extensive population and endured for a long period of time. The material of which these implements were made differed according to locality, but, notwithstanding all differences, their general likeness prevails throughout the world. While an experienced prehistoric archæologist may deter-

Fig. 94.
FANCIFUL FORM (LOBSTER CLAW) OF FLINT.
Length, 11 inches; width, 4 inches.
Humphreys County, Tennessee.
Cast, Cat. No. 98665, U.S.N.M. ⅓ natural size.

mine, from an inspection of a polished stone hatchet, from what country it comes and possibly to what locality in that country it belongs, yet the statement is true that they are substantially the same implement. The invention of the arts of grinding and polishing, together with the form of the hatchet, have been transmitted by migration or communication from people to people and from country to country; and the knowledge of the implement and the operation by which it was made descended from generation to generation and spread until it covered the five continents. A series of the polished stone hatchets from almost any one of the United States will stand as fair representatives of the same implement of any other country. The single exception to the universality of this statement is Scandinavia. Fig. 95 shows the flat side of a polished stone hatchet at the close of the first stage in the manufacture. The object is reduced to its general form, and in this stage it has often been mistaken for a Paleolithic implement. Fig. 96 represents the second stage of manufacture. Here a smaller hammer (fig. 28) is used, or possibly a bone flaker; the chips or flakes removed are smaller, and, in the opinion of some archæologists, were made by

pressure instead of being struck off; the edges of the implement are made regular, the surface reduced to a level, and the entire object is made ready for polishing.

Another method, different, but similar, was employed with the non-chipable materials; that is, hammering or pecking (*martelage*). The same stone hammer was used, and by repeated strokes in the same place the refractory substance is gradually reduced by abrasion to the desired form.

Fig. 95.

HATCHET OF FLINT RUDELY CHIPPED, FIRST STAGE, OF MANUFACTURE.
Cat. No. 99916, U.S.N.M.
$\frac{1}{3}$ natural size.

The implement having been reduced, approximately, to the desired form by either of the foregoing methods, the next step required a grinding or polishing stone. These grinding stones are found wherever the polished-stone culture existed. They are numerous in France and England. The National Museum possesses specimens from Massachusetts and from Tennessee. Fig. 97 represents one of these grinding stones from the bank of the Hiawassee River, 15 miles east of Charleston, Polk County, Tennessee. It was found by Mr. N. G. Baxter, and presented by him (through Mr. Edward Palmer) to the United States National Museum in 1882. It was reduced from a much larger piece, believed to have been solid, in order to be transported to the Museum; its present surface measurement is 22 by 14 inches. There are three grooves shown, all made by the grinding process. The largest and principal of these is 17 inches long, 5 inches wide, and 1½ inches deep, evidently made by rubbing the flat side of the hatchet thereon. One of the smaller grooves is deeper and narrower, and has doubtless served for the corners, edges, or ends of the hatchet. This grinding stone was the principal object or tool of the prehistoric workshop wherein it was found, for around it were collected no less than forty chipped and pecked implements ready to be, or in the process of being, polished. The chipped stone implement (fig. 96) is laid upon the grinding stone (fig. 97) and rubbed back and forth until ground smooth. Water might be used with it, but it should make its own sand. Fig. 98 represents the implement partially smoothed, the ridges rubbed off, and approaching completion. Fig. 99 represents the completed implement, it having been smoothed over its entire surface, save possibly some insignificant places where the fractures of chipping were too deep to be easily ground out.

Fig. 96.

HATCHET OF FLINT FINELY CHIPPED, SECOND STAGE, READY FOR GRINDING.
Cat. No. 99915, U.S.N.M.
$\frac{1}{3}$ natural size.

POLISHED STONE HATCHETS—SCANDINAVIA.

The polished stone hatchets from Scandinavia are unique. Many of them are different in form and size from those of other countries. They are larger and smoother, and have been found in such numbers in the various stages of manufacture, showing the method so admirably, and are such fine examples of art work that it would be improper to omit them. Plate 30 represents two of these hatchets. They are of the flint belonging to the country. Fig. *a* represents a hatchet chipped to form, square in section, with poll and edge indicated, and shows the process of chipping completed as indicated by fig. 96, while fig. *b* shows the process of grinding completed as indicated by figs. 98 and 99. Many of these implements are of large size, 16 inches in length not

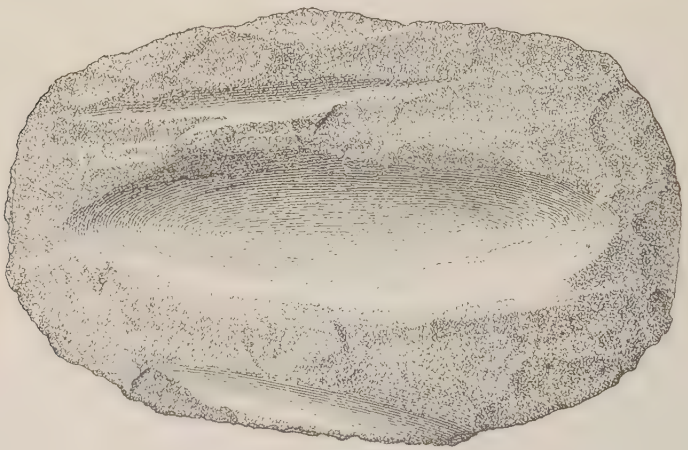


Fig. 97.

GRINDING OR POLISHING STONE FOR THE MANUFACTURE OF HATCHETS.

Hiawassee River, Polk County, Tennessee.

Cat. No. 65712, U.S.N.M. $\frac{1}{6}$ natural size.

being unusual. Their size, with their elegance and delicacy of chipping and grinding, so increases the difficulty of their manufacture as to take them definitely into the realm of fine art.

POLISHED STONE HATCHETS—HANDLED.

The frontispiece represents the method of handling these hatchets. Similar specimens have been found in almost every part of the world, though not in great plenty. The American Museum of Natural History possesses one, but the United States National Museum is the fortunate possessor of two. One of these comes from Syracuse, New York, collected by Mr. Charles M. Crounse, the other gathered by Mr. Byron E. Dodge, of Richfield, Genesee County, Michigan. Other specimens have been found in different prehistoric countries, sometimes with the handle or its fragments attached, and again with the evident marks of a

TWO FLINT HATCHETS.

a, Chipped to form, *b*, polished.

Lund, Sweden.

Cat. Nos. 101035, 100990, U.S.N.M. ⅓ natural size.

handle on the hatchet, and this method of handling has been accepted as that employed in prehistoric times.

These polished stone hatchets have been made with certain art characteristics locally peculiar. In Brittany the hatchets of precious stone have been made with pointed poll and a sharp ridge in the center toward the poll. Another peculiarity of the same locality is a button on the top or poll end of the hatchet. The same kind of a button appears on those from Guadeloupe and other islands of the West Indies. Those from Illinois have the edge broadened, as if in imitation of a bronze or copper hatchet which has been hammered to an edge and thus spread at the edges and corners. The same broadening at the edge appears in some of the hatchets from Chiriqui, though not to so great an extent as in Illinois. A peculiarity of some of the Chiriqui specimens is that, instead of being made round, square, or oval in section, they are hexagonal. These peculiarities are noticed on account of their apparent artistic feeling, and because they seem to have had no utilitarian origin. The differences in form have been mentioned as peculiarities, and so they are, for they do not apply to all the hatchets from their locality. They seem to have been fairly within the definition of art, being an attempt to decorate an object of utility, to make it more pleasing to the eye, and to be art for art's sake. No decorative designs ever appear on these implements, no inscriptions, and no marks of ownership.

Fig. 98.

HATCHET OF FLINT, PARTLY GROUND, THIRD STAGE.

Cat. No. 99925, U.S.N.M. ⅓ natural size.

Fig. 99.

POLISHED STONE HATCHET COMPLETED.

Cat. No. 35164, U.S.N.M. ⅓ natural size.

One must not forget that, despite all these varieties of art forms of hatchets, prehistoric man continued to make and use this general form of hatchet throughout the prehistoric world.

There has been not a little scientific discussion over the proposition that civilization travels along the line of least resistance; that man in performing sociologic, technologic, or industrial operations, does it, or endeavors to do it, in the easiest way, and with the least possible exertion or expenditure of force. This is an attempted application of a law of physics to a condition of sociology. It is undoubtedly a law of physics that certain, possibly all, operations of nature are conducted along the line of least resistance. The boiler bursts at its weakest spot, the chain breaks in its weakest link. All combinations of matter are made or accomplished on the line of least resistance. The existence of the law must be admitted, but its universality as to natural things is no evidence of its application to human affairs. The condi-

tions between these two, natural and human, are so different, and there is so much dissimilarity, as to invoke different laws. A law of universal application to one may have little or no application to the other.

It may be quite true that in attaining certain results a man may proceed along the lines of least resistance—that is to say, he may seek to accomplish his purpose with the least exertion or expenditure of force. But his wishes and desires interfere many times to deflect his conduct from this line. Free will, reason, and judgment are disturbing elements in man which, not found in nature, profoundly interfere with the operation of this law. They control his actions and deflect his course far from the line of the least resistance. Primitive man may have desired a knife or point for any one of the many purposes for which knives or points are used—to kill or skin his prey, to cut branches, or what not. Any sharp or pointed piece of flint, a spawl, would serve this purpose as well as the more elaborate specimens; yet we have seen that hundreds, if not thousands of times primitive man has not been content with a mere spawl, however sharp and pointed or effective it might be. Its utility alone, however perfect, did not satisfy him.

It was argued in the early part of this paper, and has been demonstrated by many illustrations, that prehistoric man had an æsthetic taste or artistic sense which controlled him equally as did utility.

The first chapter of this paper, with the arts therein elaborated, is built on this foundation. The arts of fine flint chipping, of engraving on bone, horn, and ivory, were all dependent on the æsthetic desire natural in man. The line of the least resistance, that is to say, the making of a knife or point with the least expenditure of force, would have prompted man to have used any spawl of flint or point of bone which could have been made the easiest, provided it would serve the purpose. We have seen that man did not pursue this course; that he was not contented with the rude spawl, however sharp, or the bone fragment, however pointed. His natural desire for beauty, his æsthetic taste, his artistic sense intervened and deflected his course from the utilitarian line of least exertion or resistance.

It will not do to say that the proposition of the accomplishment of results with the least expenditure of force as applied to man is devoid of truth or that it has no exceptions. This sweeping declaration would, like the swinging pendulum, carry us too far to the opposite side, and would be equally as untrue as the original proposition. The truth lies midway between the two. Man in many instances seeks to accomplish his end with the least possible expenditure. Man proceeds in most of his utilitarian projects on the lines of least resistance, and so far as utility has aided civilization there might be a foundation for this law. But art, in this regard is opposed to utility, and it deflects civilization from the lines of least resistance.

Nearly all prehistoric art work would have been avoided if the man who made the implements and objects described had proceeded on the

POLISHED STONE HATCHET AND HANDLE COMBINED, WORKED OUT OF SOLID ROCK. DIORITE (?).
U. S. National Museum. ⅛ actual size.

lines of least resistance and contented himself with the thing which was cheapest and easiest made, and would have served his utilitarian purpose. Nearly all work done by man for artistic purposes is in opposition to this law, for man's desire for beauty, his æsthetic taste, his artistic sense, induce him to expend an infinite amount of labor in the production of an implement which would have been of equal utility without it. The fine flint chipping and the engraving on bone have been mentioned. The decorations, the great number of which are set forth in plates 13, 14, 15, 19, and 20, were not utilitarian. They were, so far as utility was concerned, a useless expenditure of force, without value, and in defiance of the law invoked.

This statement applies with equal force to many other prehistoric art works. Pottery and bronze objects were almost universally decorated without regard to utility, and only to gratify the æsthetic taste. The jade implements, the polished stone hatchets, the entire list of *forma curiosa*, in fact all the "art for art's sake," and the labor expended to gratify the æsthetic taste of man and to satisfy his innate desire for beauty, were in defiance of this rule.

The foregoing argument can be upheld by many specimens, but its truth is demonstrated by the implement shown in plate 31, and its consideration in connection with the frontispiece.

The arrow- and spear-head were the standard primitive projectile weapons. The ax or hatchet was the standard primitive cutting implement, performing its function by blows. The Paleolithic implements corresponding to these were made usually of flint and solely by chipping. In the Neolithic period the hatchets, while chipped or pecked into shape, were smoothed or polished by friction on a grinding or polishing stone. The various steps of the process are shown in figs. 95 to 99. These or similar implements have been found throughout the world, wherever it was occupied by Neolithic man. Their method of use is shown in the frontispiece, where the original handle was found with the hatchet inserted and ready for use. The discoveries of these handles are rare, owing probably to the ease of their decomposition and destruction, but they have been found in every country associated with the hatchet in such a way as to identify their use in this manner. It has therefore been decided that the primitive man thus used them, and that practically all of the numberless polished stone hatchets found throughout the world have each one had their handle similar to that in the frontispiece. The specimen shown in plate 31, while the same implement as that in the frontispiece, differs from it in that it has a stone handle and has been worked out of the solid. Whether it was a piece of rock from a ledge or a water-worn bowlder, we have now no means of determining, for the original surface has been removed in the process of manufacture. It is hard stone, probably diorite; the material is highly refractory and does not chip or flake as does flint. It could never have been reduced even approximately to its present

form by chipping, as was frequently done with similar implements, especially with flint, and of which plate 30 furnishes an excellent illustration. The implement (in plate 31) was reduced to shape by grinding or rubbing and not by chipping. The grinding of an object of this size from its original condition of bowlder or ledge rock into the symmetrical weapon here shown must have required immense labor. This work would be long, arduous, tedious, and difficult, and would require of the workman great tenacity of purpose and fearlessness of fatigue. We have no means of knowing the difference between the amount of labor required to make the implement in plate 31 and that shown in the frontispiece, but it may be surmised, for the purpose of argument, that the same amount of exertion, time, and labor expended on the latter would have made a hundred of the first. Yet the implement thus laboriously made is, for all utilitarian purposes, no better than any one of the hundred which could have been made in the same time. Indeed, it is hardly so good, for, being of stone, it is heavier and, as the blade can not be taken out of the handle, it is more unwieldy and troublesome to carry. The only reason apparent that impelled primitive man to make this implement with an expenditure of so much more force than would have been required for the commoner specimen, was the gratification of his æsthetic taste. In order to gratify it, he was willing to expend this extra force. This implement is, therefore, an illustration of what is found to be true in thousands of other objects—that their makers were willing to endure fatigue and labor long continued, in order to gratify their desire for the beautiful. And in proportion as this is true, so did he not proceed along the lines of least resistance, but rather in defiance of the rule.

Drilling in Stone.

This was one of the arts of prehistoric man during the Neolithic period. It was continued into the Bronze age and thence down to historic times. It is so difficult in performance, and yet was so successfully performed, as to entitle it to a place among the fine arts. Ordinary drilling performed in a common or clumsy manner might not be entitled to such mention, and the art obtains the right to be classed as fine, only from the number of wonderful specimens which have been found, the difficulty incident to the performance, and the success attending it. Scores of examples can be given from both Europe and America in which the drilling shown is at once delicate and difficult. In America the prehistoric man desiring to make an ax made a groove around it and handled it by a withe. His European brother of the same period drilled a hole in his ax and inserted a handle after the fashion of the sledge. He appeared, in both hemispheres, to be master of the art of drilling, for, contrary to the way of the white man, he made the implement perfect and complete, even to its smoothing and polishing, before he began to drill the hole. As said in the chapter on

flint chipping, he seems to have been able to toy with his art and perform it in any way he pleased. He drilled large holes and small, he used hard drills and soft, the latter even of pine wood. He used hollow drills as well as solid, and we have cores that have been drilled from one or both sides with a straightness and evenness that seems marvelous. He was able to start his drill on the smooth and polished surface of a hard stone, apparently without any wobbling of the drill, leaving the edge of the hole as smooth and sharp as though it had been afterwards reamed or turned. The prehistoric objects found in the mounds of the United States are of even finer workmanship and more artistic than is usual in Europe.

Pipes, tubes, etc.—These objects, sometimes of hard stone, are drilled in a remarkable manner, which, when considered as the work of a savage, done without metal tools, excites our wonder and admiration. The pipes have been drilled in several directions and at different angles.

Plate 74 (in the chapter on musical instruments) represents divers stone tubes supposed to have been used as trumpets or horns, but they will serve as illustrations of the art of drilling. A certain number display this art in a high degree. The long cylindrical tubes do not show to the casual observer their real value as representatives of this art. Although only about 1 inch in diameter and of length varying from 6 to 12 or 14 inches, they have been drilled their entire length with a hole more than one-half their diameter, and all from one end—that is to say, the drilling of this large hole has been begun at one end of the finished tube and continued until nearly through at the other end, when the drilling (of the large hole) was stopped, the tube reversed, and drilled from the other end with a small hole which met the large one. The evidence of this manipulation is abundant, and is here treated as a fine art because of the manual dexterity required to drill accurately and continuously a large hole through so small a cylinder for such a distance without break or change of direction.

It is not intended to pursue the subject of drilling in this paper, only to call attention to its existence as a fine art and to note the delicacy and difficulty in some of the operations as shown by the specimens. The reader who is desirous of pursuing the subject further is referred to the paper on this subject by Mr. J. D. McGuire, published in the report of the United States National Museum for 1894. Many of the specimens described by Mr. McGuire are from the Division of Prehistoric Archaeology.

Ceremonial Objects.

Many ceremonial objects show fine execution in the way of stone drilling, and the subject will be continued incidentally during their description.

There were a large series of objects in use among the aborigines of

North America, the purpose of which is unknown, which, for want of a better name and in accordance with a supposed use or function, have been called "Ceremonial objects." Any description of or argument concerning their possible use would be part of the history of the civilization of the times and belongs to technology, or to industrial, but not fine art. They have been pecked or battered into general, then ground into particular form, then polished, and lastly drilled. The correctness of their forms, their symmetry, their smoothness of surface and perfection of detail, together with the supposition of their ornamental and not utilitarian function, causes them to be classed among objects of fine art.

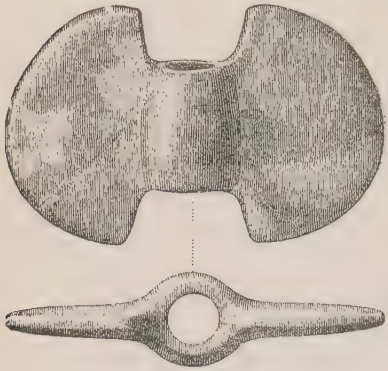


Fig. 100.

BANNER STONE, QUARTZ, DRILLED AND FINELY POLISHED.

Illinois.

Cat. No. 30191, U.S.N.M. ½ natural size.

Banner stones.—This name has been given empirically and only for want of a better. Fig. 100 represents one of these implements, half size. It was found near Dubuque, Iowa, by Mr. H. T. Woodman, is of ferruginous quartz, translucent, reddish color passing over to white, within one or two degrees of being as hard as the diamond. Despite all its rounded corners and smoothed edges it will scratch glass without difficulty. It has been hammered or pecked, ground, polished and drilled, and its entire surface made smooth as glass. It is symmetric viewed from either side or edge. The amount of skilled labor required to reduce it to its present elegant appearance, the difficulties in accomplishing this, all of which was only to produce an ornament, justifies its classification among objects of fine art. Fig. 101 represents another specimen of the same kind. It has been finished in the manner just described, and it is submitted with the same idea. It was found in Prince George County, Maryland, and was contributed by Dr. E. E. Reynolds.

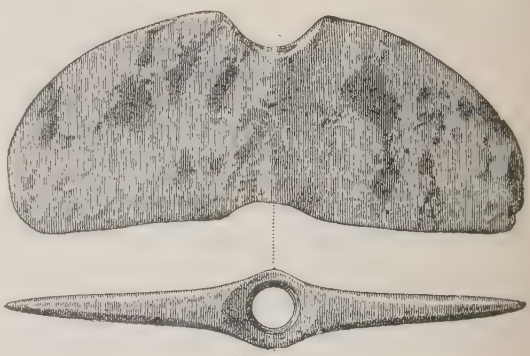


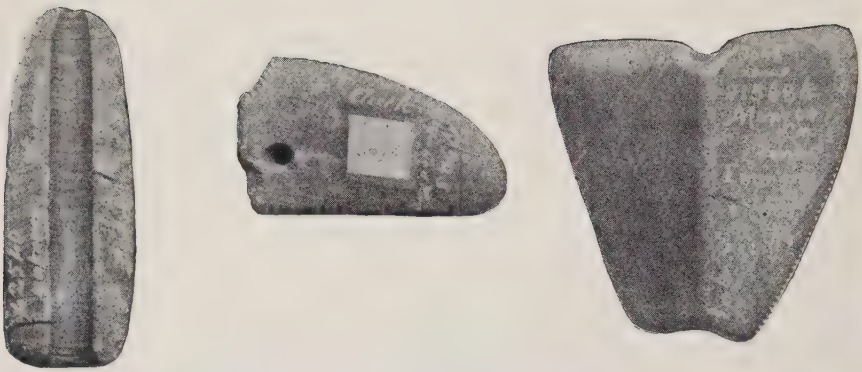
Fig. 101.

BANNER STONE, SYENITE, DRILLED AND FINELY POLISHED.

Prince George County, Maryland.

Cat. No. 34648, U.S.N.M. ½ natural size.

Fig. 102 represents another banner stone of the same general style, introduced because of its beauty and the fineness of its manufacture.



THREE BANNER STONES (TWO BROKEN).

Cat. Nos. 42540, 17923, 115685, U.S.N.M. $\frac{8}{20}$ natural size.

The thinness of the blade as well as of the barrel or center, with the size of the hole, leaving the walls so thin and frail, are all to be remarked as evidence of the mechanical skill and manual dexterity of the aborigines. Fig. 103 is an implement which may or may not be one of the banner stones, but it is evidently related thereto. It might pass for a hatchet or double-bitted ax, the hole being drilled in the center as for a handle, but this use is negatived by the fragility and softness of the material, which is banded slate. The entire surface is highly polished and the outlines are true and correct. The edge is as sharp as the material will make. The hole, however, is quite too small for a handle by which the implement could be used as an ax. A single blow would destroy it, breaking both its edge and the hole. A ceremonial use is the only one suggested for these and similar implements. Fig. 104 was received from Peale's Museum, Philadelphia, and was originally from near Norristown, Pennsylvania. It is of slate, and has been worked up to its present perfected state by the operations already described. The form is peculiar and shows the nonutilitarian character of the implement. The sectional view explains the drilling. Plate 32 represents three of these objects. The first, from Tennessee, is whole; the second has been broken in half and drilled as though for secondary use—possibly as a pendant. These two specimens are introduced to show the decoration, consisting of fine notches like saw teeth cut in the edges, and are the only pieces so marked in the entire series of these objects in the United States National Museum. In the one object these notches have been cut at right angles on the edge, while on the other

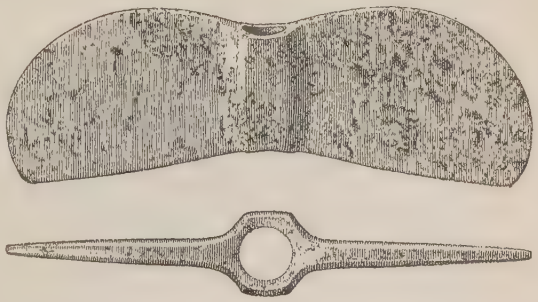


Fig. 102.
BANNER STONE.
Hudson City, New Jersey.
(Original Amer. Mus. Nat. Hist., New York.) Cast, Cat. No. 1170, U.S.N.M.
½ natural size.

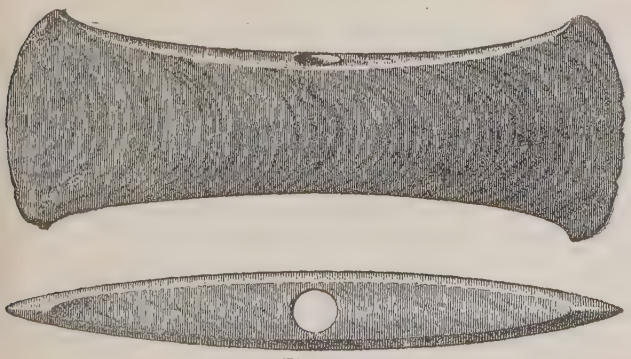


Fig. 103.
BANNER STONE OF BANDED SLATE.
Paris, Kenosha County, Wisconsin.
Cast, Cat. No. 11691, U.S.N.M. ½ natural size.

they have been cut on only one side of the edge. The purpose of these notches is entirely unknown; they might have been utilitarian or ornamental, but in our present state of knowledge no one is justified in saying which. They are submitted as possible ornamentation. The third specimen represents one of these objects in which the drilling has just been completed, when the object split longitudinally. It is presented to show the drilling with all its interior ridges before being smoothed, and one may see by the failure to complete the hole how the drilling had all been done from one end.

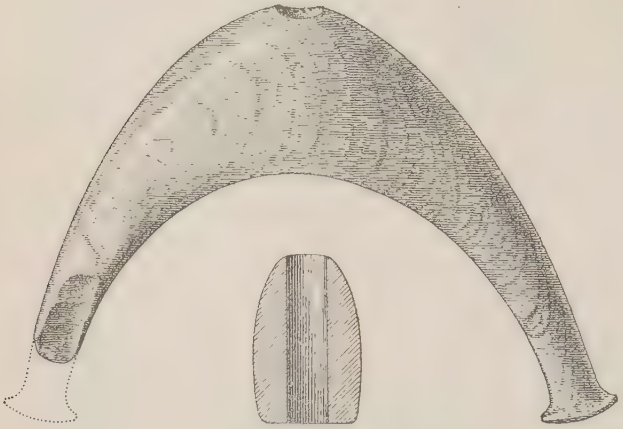


Fig. 104.

BANNER STONE OF SLATE, CURIOUS FORM, BROKEN.
Norristown, Pennsylvania.
Cat. No. 8024, U.S.N.M. ½ natural size.

Bird-shaped objects.—Fig. 105 is from western New York. It is made in the form of a bird, which from the number of similar specimens have given the name to this class. The eyes are represented by great protuberances which must have greatly increased the difficulty of manufacture. It was made from a bowlder or large piece, and while the material is hard, it is not tough but rather fragile. It could not be chipped like flint nor whittled like soapstone, but must have been hammered or pecked into shape and afterwards ground to its present form, then polished until it is as smooth as glass. A consideration of the conditions demonstrates the difficulty of making this object and the dexterity and experienced working required. The United States National Museum possesses many of these specimens. While they bear a greater resemblance to birds than anything else, yet scarcely any two of them are alike, and they change in form through the whole gamut until it is difficult to determine whether it is a bird, a lizard, or a turtle, and finally the series ends in a straight bar without pretense of representing any animal.

Boat-shaped objects.—Fig. 106 represents a boat-shaped object, so called for the same reason that others were called bird shaped—because it was nearer that than anything else. There is an extensive series of these, from those closely resembling a boat and elaborately and carefully made to those of the rudest form. They, like all the others, have been brought to the general form by hammering or pecking and then grinding and polishing. Their purpose, also like the others, is unknown.

It has been suggested that certain of them of the plainer kind were twine twisters, handles for carrying parcels, or for tightening cords or lines. A Mohawk medicine woman declared them to be amulets or

Fig. 105.
BIRD-SHAPED (?) OBJECT.
Western New York.
Cat. No. 32298, U.S.N.M. ¾ natural size.

charms to enable the witches to ferry themselves over streams of water, as the broomstick serves modern witches for flight through the air. If this object should be lost, it was believed that her power of flight or

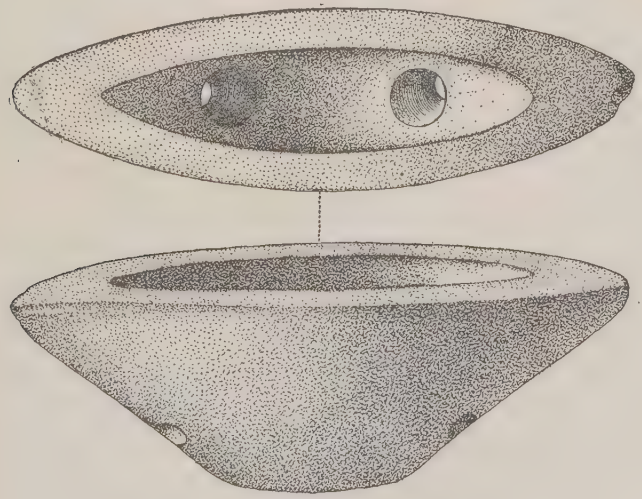


Fig. 106.
BOAT-SHAPED OBJECT.
Sterling, Connecticut.
Cat. No. 17903, U.S.N.M. ¾ natural size.

passage was gone. Contrary to every possible usage of these objects as boats, even as toys, they are all drilled and usually with two perforations.

The forms of this implement are varied. Fig. 107 represents one of these objects apparently at the other end of the series, while there are others of intermediate form. This one is flat, thin, not hollowed out, is narrowed in the middle and widened at the ends, and has its two holes drilled close together. Many of these objects are of hard stone, like syenite, greenstone, etc., while a limited number are of galena. Their general purpose seems to have been as an ornament of some kind, which, with their symmetry, execution, finish, and the difficulty in accomplishing all these, entitles them to be classed among objects of fine art.

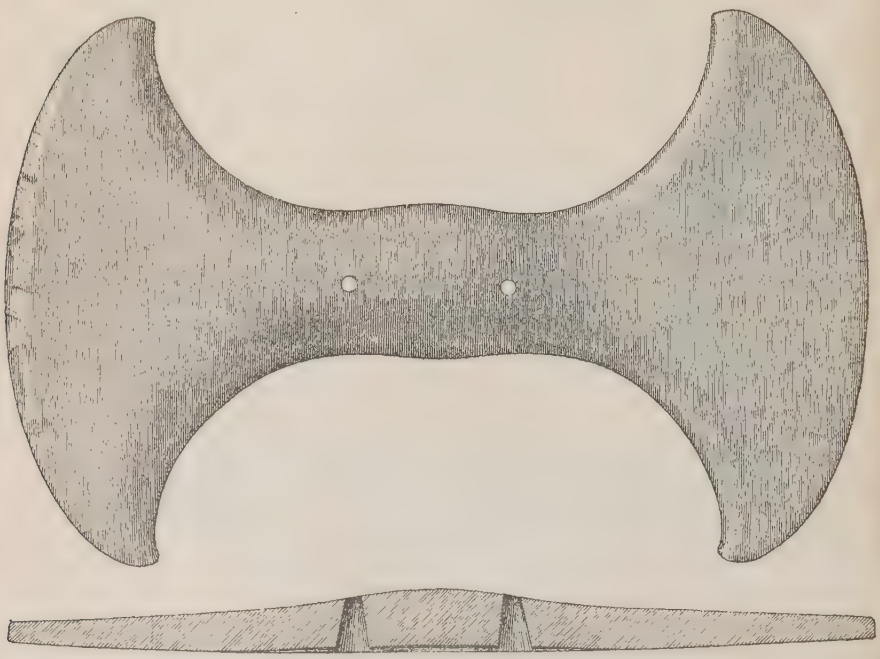


Fig. 107.
BOAT-SHAPED OBJECT (?) OF PECULIAR FORM, SLATE.
Indiana.
Cat. No. 98059, U.S.N.M. ⅓ natural size.

Gorgets and pendants.—These were also objects of ornament and ceremony. Most of them are of slate, thin, not difficult to make, nor yet particularly beautiful when made. Others, however, either from their material or otherwise, become more difficult and have certain ornamentation, and should not be omitted from among decorative art objects. The difference between the gorget and pendant seems only to have been in the number and position of the holes. A gorget might have been fastened upon the arm as an ornament, while a pendant, unless very small, could scarcely be, though both may have been suspended from the neck and worn on the breast.

Plate 33 represents five of these objects, the sixth being of hematite and passing under another denomination. The first (No. 139531, U.S.N.M.)

GORGETS, PENDANTS AND PLUMMETS OR CHARMS.

Cat. Nos. 97853, 62578, 97423, 60206, 139531, U.S.N.M. ⅔ natural size.

is introduced because of the material, which is porphyritic diabase and comes from Michigan. It has two holes and may have been worn either on the arm or the breast. No. 62578, U.S.N.M., is of soapstone, and from Tennessee. A third (No. 97423, U.S.N.M.) is of red jasper from east Tennessee. The other two are of slate and show their respective decorations. The sixth specimen of hematite, though classed as a pendant, the justification for which is the little groove around the small end apparently intended for a string or cord by which it was suspended, belongs to a class distinct from the others. They are always round, are symmetrical, and with all their hardness are made smooth and usually well polished. They have been classed as plummets and charms, as well as pendants. Occasional specimens have a hole drilled through the small end instead of the groove, while others have the lower end made the same as the upper, also grooved or drilled. Archæologists are far from being agreed as to the use of these implements, the disagreement being indicated by the different names given to them, but all will agree as to the beauty of the specimens and the propriety of classing them as works of art.

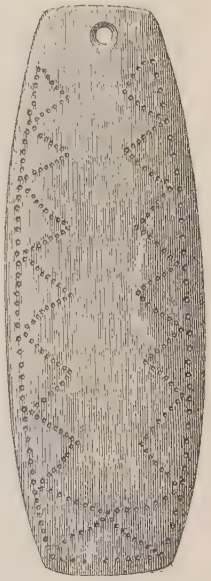


Fig. 108.

PENDANT, WITH DECORATION OF ZIGZAG POINTS.

Norwich, Connecticut.

Cat. No. 17905, U.S.N.M. ½ natural size.

Fig. 108 from Norwich, Connecticut, is of greenish gray trap rock, with convex edges. It has one hole drilled near the end as though for suspension from the neck and to be worn on the breast. It has been ground and smoothed all over and is decorated on one side and around the edge by a row of extremely small dots with zigzags of the same. The opposite side is plain.

Fig. 109.

PENDANT, OVAL FLATTENED PEBBLE WITH DECORATION OF INCISED LINES.

Tiverton, Rhode Island.

Cat. No. 17596, U.S.N.M. ½ natural size.

The great mass of these gorgets and pendants are plain, a few have been scratched with figures which might be hieroglyphs or ideographs, but they are so extremely rude as to be of slight value from an artistic point of view, and so many are of doubtful authenticity that none are presented.

Fig. 109 represents another of these objects which, while evidently used for suspension, may have served in any place. It is from Tiverton, Newport County, Rhode Island. It is an oval, flattened pebble with incised lines as represented.

Chungkee stones.—If the civilization or sociology of the prehistoric man was being presented these objects would be classed with games or athletics, but because of the hardness of the material and difficulty of

manufacture, together with their use as a means of pleasure, if not of ornament, it is not improper to assign them a place here. The United States National Museum possesses an extensive series which, for some unexplained reason, extends into almost every imaginable disk form. Fig. 110 represents a side and sectional view of one of these objects of yellowish brown quartzite. It is drawn half size, and is a large and weighty object. Most of the large specimens are of quartz, either yellow or white. They are disk form, the edges are rounded, the center on both sides has been cut out and made cup-shaped. He who could make this object, accomplishing all these requirements from an irregular piece of rude, hard quartz, and produce a specimen of such regularity of form and correctness of design must have been an artist of considerable experience. For, be it understood, that in this, as well

Fig. 110.

CHUNGKEE STONE, SIDE AND SECTIONAL VIEWS. YELLOW QUARTZ.

McKenzie, Carroll County, Tennessee.

Cat. No. 34513, U.S.N.M. ½ natural size.

as in all foregoing objects, the work was done by hand, and only with the usual tools for hammering, pecking, grinding, smoothing, and polishing. It has been suggested that these may have been made with the lathe, but an investigation shows this not to have been so.

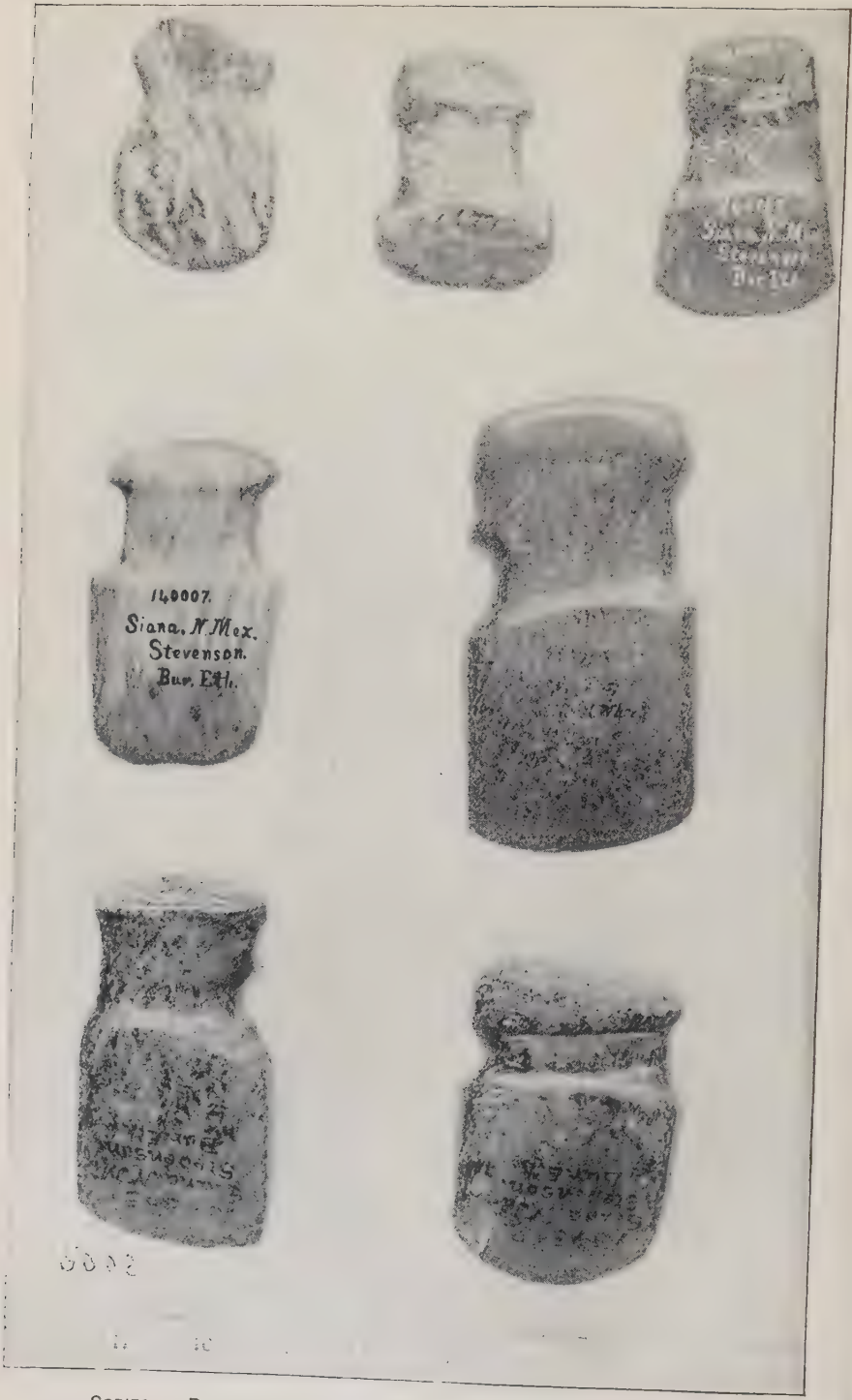
Beads.—Beads of jasper are not infrequently drilled, and the United States National Museum possesses some jasper pieces of extraordinary length—for example, 3 inches—less than $\frac{3}{8}$ inch in diameter, and a hole half the thickness of the bead drilled through its entire length. This hole is put exactly through the center of the cylinder, without apparent enlargement or smoothing, as though it had been drilled from one end only, but whether done this way or drilled from both ends the delicacy of the work and the precision with which it was done, when remembered to have been the work of a savage, is marvelous.

SERIES OF EUROPEAN PREHISTORIC POLISHED JADE HATCHETS.

U. S. National Museum. ⅛ natural size.

SERIES OF AMERICAN PREHISTORIC POLISHED JADEITE AND NEPHRITE HATCHETS.

U. S. National Museum. $\frac{7}{15}$ natural size.



SERIES OF POLISHED AND GROOVED ACTINOLITE AXES AND HAMMERS,
FROM THE PUEBLOS OF NEW MEXICO AND ARIZONA.
U. S. National Museum. $\frac{5}{11}$ natural size.

Lapidary Work.

JADE AND HARD STONE OBJECTS.

There are many specimens classed as polished stone hatchets, because of the similarity of form, material, mode of manufacture, and use; and yet, because of their rude character and rough appearance, they are not works of art. But some of these implements of hard and semi-precious stones, from purity of form, difficulty of fabrication, and their fine and beautiful finish, may be justly classed as works of art. These are mostly polished hatchets of some of the varieties of jade. Plate 34 represents a series of these magnificent implements from various prehistoric stations in western Europe.

Jade is remarkably hard and tough. The latter quality is said to be produced by the arrangement of its fibers in small interlaced bundles. It is and always has been regarded in China and the oriental countries as one of the precious stones, its hardness and the difficulty of working having conspired to greatly enhance its reputation. Except a single piece only partially determined, lately found in Austria, none of the raw material has ever been discovered in western Europe, yet prehistoric implements of this material have been found throughout western Europe amounting to many thousands, Lake Constance, Switzerland, alone having furnished 2,000 specimens. This material and its use in prehistoric times opens many abstruse questions concerning migrations of primitive peoples and of the possible extent of their commerce. The most of these implements found in the Swiss lake dwellings are of jadeite, of which the component parts are: Silica, 58 to 60 per cent; aluminum, 22 to 26 per cent; soda, 10 to 12 per cent; with a specific gravity of 3 to 3.3. It is extremely hard, ranking 8 or 9 in the scale of which the diamond is 10.

The same material is found manufactured into implements of the most elaborate and difficult kind in great profusion in Mexico and Central America. Plate 35 shows specimens thereof. These are all in the United States National Museum. Their locality, appearance, or use need not be described; it will be sufficient to say that they belong to the prehistoric period in Mexico and Central America.

Fibrolite, still another variety of jade, is confined to southern and western France. It is composed of: Silica, 34 or 35 per cent; aluminum, 63 to 65 per cent; with a specific gravity of 3.2 to 3.3.

Actinolite, still another variety, is composed of: Silica, 0.60; magnesia, 0.21; lime, 0.14 per cent; with a specific gravity of from 3 to 3.1. Its distribution is throughout the Pueblo country of Arizona and New Mexico. The specimens shown in plate 36 are these actinolite grooved axes and hammers from that locality, and belong to the National Museum.

Nephrite is still another specimen of jade, the component parts of which are: Silica, 56 to 58 per cent; magnesia, 20 to 22 per cent; lime,

11 to 14 per cent; oxide of iron, 5 to 8 per cent, and aluminum, 1 to 3 per cent; with specific gravity 2.9 to 3.

A profusion of prehistoric implements, principally axes or adzes made of nephrite, have been found from the Straits of Fuca northward along the entire coast of British Columbia and the northern end of Alaska. (Plate 37.)

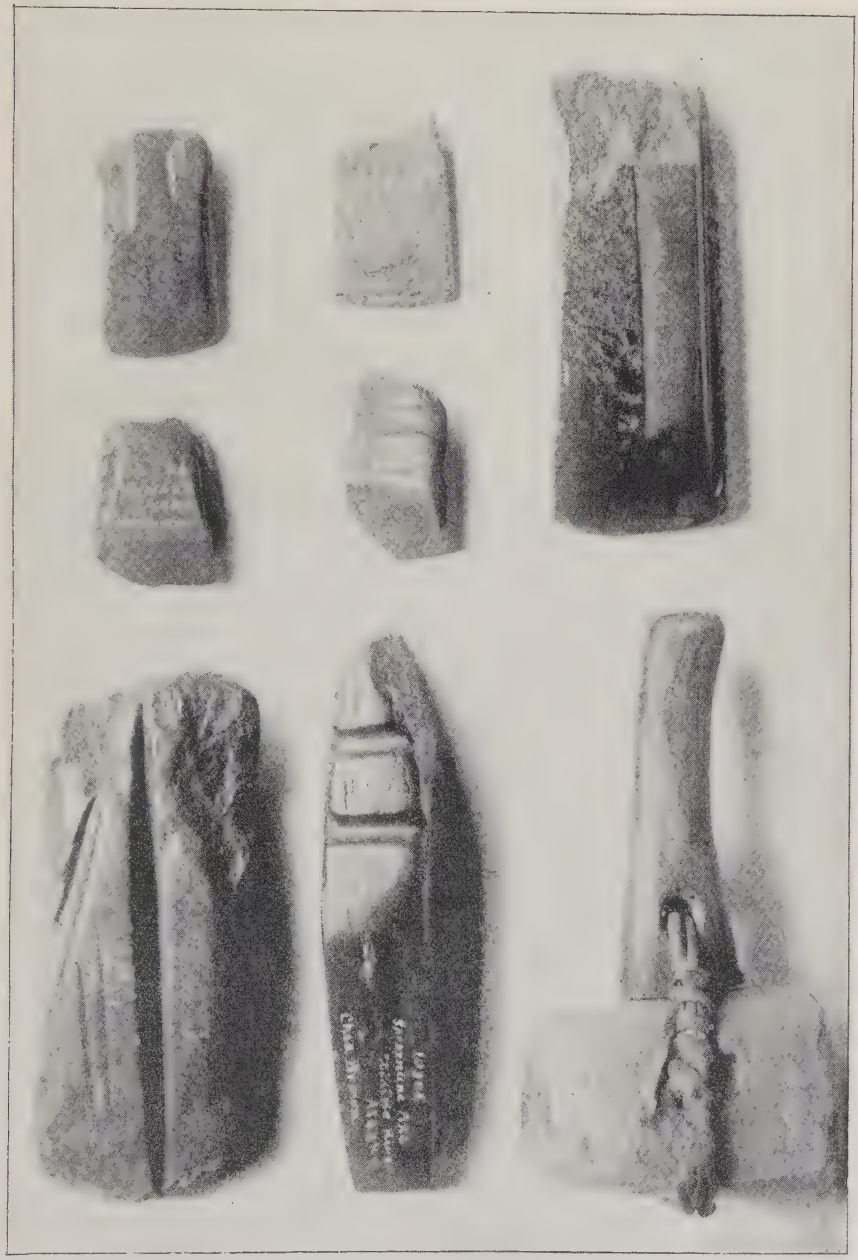
Pectolite is composed of: Silica, 54; lime, 33; soda, 9 per cent; with a specific gravity of 2.7 to 2.9. It is found among the Eskimos and the Indians on the northwest coast of North America. Its principal service is as a hammer, for which use it is prepared with a withe and lashed to a wooden handle (Plate 37), and as an evidence of the almost universal art instinct of prehistoric man, this hammer, which might have been only a rough stone in every part except its face, has, despite its hardness and the difficulty and tediousness of the work, been pecked or hammered into a symmetrical form and then ground or polished to a smooth and regular surface, as though this were required for utility.

The finding of two partly worked bowlders of nephrite on the lower part of the Fraser River, at Lytton and Yale, British Columbia, respectively, and the discovery of unfinished objects in old Indian graves near Lytton, make it certain that the manufacture of adzes had been carried on there.

A series of specimens, numbering sixty-one in all, have been deposited in the Museum of the Geological Survey, at Ottawa, and in the Redpath Museum, McGill College, Montreal. These consist of both nephrite and pectolite implements, as adzes, drills, axes, etc. Of the sixty one objects found, seventeen show that they have been sawed from other pieces. A prolific source of supply of this mineral in primitive times, now known as Jade Mountain, is situated about 150 miles above the mouth of the Kowak River, in Alaska. The world is indebted for the discovery of this mountain to Lieut. G. M. Stoney, United States Navy, who has brought down, and presented to the United States National Museum, quite a number of specimens. Plate 38 represents sundry of the pieces, some water-worn bowlders and fractured fragments of the material, accompanied by two or three manufactured specimens. This is the only known source of supply of this mineral in America.

Migration.—When implements are found which, upon analysis, contain the foregoing component parts and are determined to be of this mineral, it raises a fair presumption that they came from this source of supply, and is presumptive evidence of prehistoric communication, if not migration, between the peoples. This is true only to a certain point, and is not susceptible of universal application. It does not follow that all nephrite objects came from Jade Mountain.

Jadeite is an entirely different mineral from nephrite or any of the varieties of jade, and must, or at least may, have had a different place of origin and come from a different direction.



SERIES OF POLISHED NEPHRITE AXES AND ADZES (ONE PECTOLITE HAMMER), FROM ALASKA.

U. S. National Museum. $\frac{1}{2}$ natural size.

SERIES OF NEPHRITE BOWLDERS AND FRAGMENTS THEREOF FROM ALASKA, DISCOVERED BY LIEUTENANT STONEY, UNITED STATES NAVY.
U. S. National Museum.

SERIES OF POLISHED, WROUGHT, AND SAWED STONE OBJECTS OF SEMIPRECIOUS CHARACTER, PRINCIPALLY JADEITE, FROM CENTRAL AMERICA.

Obverse and reverse views of same objects.

U. S. National Museum. ⅓ natural size.

SERIES OF POLISHED, WROUGHT, AND SAWED STONE OBJECTS OF SEMIPRECIOUS CHARACTER, PRINCIPALLY JADEITE, FROM CENTRAL AMERICA.

Obverse and reverse views of same objects.

U. S. National Museum. $\frac{2}{3}$ natural size.

Prof. F. W. Putnam presented before the American Antiquarian Society in 1886, from the Museum at Cambridge, a series of carved and sawed objects in jade from Mexico and Central America, and his theory of accounting for them was that they had been brought from Asia on the original migration of the peoples; that in after time the communications between the two countries were suspended and gradually ceased. Thus the supply of these objects was cut off, as none of that mineral having been found in that country (either then or since). They came to be regarded of great value as amulets or charms, and were sawed into pieces for a more extended distribution. That such objects belonged to these countries, and that they were divided or cut by sawing and were susceptible of a correspondingly increased distribution is a fact that can not be denied. The United States National Museum possesses series of such objects in considerable numbers. Plates 39 and 40 represent a tray of them, showing obverse and reverse. The two plates represent opposite sides of the same objects. They will be noticed further when considering lapidary work.

Dr. Heinrich Fischer, of Freiburg, Baden, supported the migration theory, alleging the great similarity between the Mexican and Central American jadeites and those in Burmah. Dr. A. B. Meyer, of Dresden, attacked the migration theory fiercely and maintained the greater probability of the indigenous character of the mineral. Professors Clarke and Merrill, of the United States National Museum, published a paper[1] on "Nephrite and Jadeite." It consisted largely of chemical and microscopical investigations and determined with great certainty the substantial differences between the minerals. Their conclusions, so far as relates to the migration theory, are as follows:

> That these substances are comparatively common constituents of metamorphic rocks, and hence liable to be found anywhere where these rocks occur. Their presence (in any given place) is as meaningless (so far as concerns the migration theory) as would be the finding of a piece of graphite. Their discovery (among prehistoric peoples) possesses no value in the work of tracing the migration or intercommunication of races.

It is not possible to determine this jade question positively or absolutely. We do not possess sufficient knowledge to solve it finally. Whatever may be at present determined is subject to a reversal by a discovery which may be made at any time in the future. If a jadeite mountain should be found in Mexico or Central America as a nephrite mountain has been in Alaska, it would settle the question at once, but until a ledge or quarry of jadeite shall be found in America the question must be left in abeyance. The discovery of the place of origin of jadeite in America may never be found, and consequently the question may never be absolutely solved.

Various efforts have been made to discover jadeite in its natural deposit in Mexico and Central America, but never yet with success.

[1] Proc. U.S.Nat.Mus., XI, 1888, pp. 115–130.

The latest effort was that made by Mr. A. Sjogren, a learned Scandinavian geologist interested in prehistoric anthropolgy, acquainted with the importance of the "jade question," and always on the lookout for any evidence that would shed light thereon. He resided for a time in Costa Rica, with full opportunity for the investigation of and acquaintance with the jadeite objects in that country. During his visit there he made more or less extensive searches for the evidence of indigenous jade. He found a number of pebbles the appearance of which suggested that they might be the desired material. On his return to his native country he stopped at Washington, and, visiting the United States National Museum, he invoked the aid of Professor Merrill, Curator of Geology and Mineralogy, and the author, as Curator of Prehistoric Anthropology, who opened the cases in his department and produced implements from Costa Rica and the neighboring countries for comparison with the specimens brought by Mr. Sjogren. The result was that eight specimens of pebbles were selected as having the greatest similarity with the material of the jade implements, and it was proposed to put them to test of microscopic investigation. Professor Merrill accordingly made thin sections of these for that purpose, and has just reported the result of his investigations. He says:

Nos. 1, 3, and 8 are without doubt an altered pumiceous tuffa, identical with No. 59899, described by Professor Clarke and myself in our paper in Proceedings of the United States National Museum, Vol. xi, page 127.

This specimen (No. 59899, U.S.N.M.) was from San Huacas, Costa Rica, dark green, not mottled, soft, specific gravity 2.282, and its composition as follows:

Ignition	10.39
Silica	70.49
Alumina	11.39
Ferrous oxide	2.39
Manganous oxide	Trace.
Lime	3.83
Magnesia	.57
Alkalies	Undetermined.
Total	99.06

A microscopic examination shows that the mineral is evidently a highly altered volcanic tuff, but very difficult to make out. The mass of the rock is made up of a greenish-gray amphorous felt, through which are scattered round bunches of a bright-green chlorite and small, colorless points and elongated crystals, which may be felspathic, although they are too small to show twin striæ. There are also occasional colorless elongated and curved shreds, which are wholly without action in polarized light, and which are doubtless glass.

He continues as to the Sjogren specimens:

Nos. 2, 4, 5, and 7 are highly siliceous rocks of rather obscure nature, but consisting largely of chalcedonic silica, and if not true chalcedonic secretions, are at least very compact fragmental rocks that have been acted upon by silica-bearing solutions. No. 7 shows occasional minute circular areas with concentric structure,

which are doubtless silicified remains of foraminifera, such as are not infrequent in siliceous nodules found in limestone. There is nothing in the series in the least resembling true nephrite or jadeite.

The concluding sentence leaves the discovery of the origin of jade material, of which the Costa Rica prehistoric implements were made, as much an unsolved problem as ever. But negative results from the searches of an experienced geologist made on the spot are of more value than has been generally admitted, and the thanks of prehistoric anthropologists are due to Mr. Sjogren for his interest and efforts. It is certainly remarkable that, with the thousands of prehistoric implements from Mexico and Central America, no specimens of the natural material has ever been found in any of those countries.

There are other views which seem to narrow the question of jade migration, if they do not elucidate it. It would appear highly improbable that any such migration of peoples could have been made by land between the place of origin in Burmah and the place of its discovery in Mexico and Central America. We can scarcely conceive of a migration, comprised of however great or small numbers, which would start from Burmah overland by way of Bering Straits for Mexico and Central America, carrying with them such small implements and in such great numbers. If they did, these implements would run great risks of being lost. Arrived in Alaska, the emigrants ought to have found some traces or specimens of the nephrite, wrought or unwrought, of which we now find so many. One or two hypotheses force themselves upon us: The emigrants (from Burmah) might have left some of their own jadeite implements in Alaska or obtained some of the nephrite. No traces have been found of either. Then these emigrants would have started on their southwestern trip, a distance of several thousand miles, to Mexico, without leaving anywhere any trace of jadeite implements. Arrived at Mexico, and thence on through Central America, are to be found implements, all of jadeite, by the thousand, but none of nephrite. If these emigrants traveled by land from Burmah to Mexico, crossing at Bering Straits, it would involve a long and necessarily tedious journey. In Alaska these emigrants would enter a country where there was a mountain of this precious mineral, the prehistoric inhabitants of which well knew how to make it into implements. No other implements or objects, of this or similar material, have been found along the indicated route which would serve as extraneous evidence of such migration.

The foregoing argument seems satisfactory to the author against a migration of jade or jade implements by land from Burmah to Mexico or Central America. This leaves only the ocean as a means of migration, and that such a journey should have been voluntarily made across such an ocean seems almost incredible. It would appear, in view of the difficulties and obstacles to such journeys or migrations, either by land or sea, that the only course left to deal with the jade question is to await further developments and discoveries.

It is not intended in this paper to pursue the question of jade from a mineralogic or an archæologic point of view. Anyone desiring to do so is referred to the works of Professors Meyer, of Dresden; Fischer, of Freiburg; Damour, of Paris; "Nephrite and Jadeite," by Professors Clarke and Merrill;[1] "The Occurrence of Jade in British Columbia,"[2] by Dr. Dawson, and to "Gems and Precious Stones,"[3] by Mr. George F. Kunz, it being the intention of the author to confine his discussion to the art side of the question; and from this side he refers with approbation to the forthcoming edition de luxe of the volume on jade by Mr. H. R. Bishop, of New York City.

Mr. Kunz, the gem expert with Tiffany & Co., in his work, "Gems and Precious Stones,"[4] speaks of the ancient lapidary work as follows:

The chipping of an arrow point, the grinding and polishing of a groove in an ax head, the drilling of a bead or tube or an ear ornament, all are done by the application of the same lapidarian methods that are practiced to-day by cutters of agates or precious stones. The cutter of to-day, with a hammer, chips into shape the crystal or piece of agate before it is ground; and there is little difference between the ancient method of drilling and that of the present. The stone bead of ancient time was drilled from both ends, the drill holes often overlapping or not meeting as neatly as by the modern method of drilling from one end.

The old way of drilling is still practiced in the east, where the primitive bow drill is used by lapidaries to-day precisely as it has been used by savage tribes in all quarters of the globe, though producing at different periods different qualities of work. Nowhere was its use better understood than in ancient Greece and Rome, where, by its means, were engraved the wonderful intaglio and cameos which now grace our museums, and which have never been surpassed in any period of the world's history. For the special use of gem engraving, the bow drill has been replaced by a horizontal lathe, which, however, does not allow the freedom of touch or deftness of feeling which artists attained by use of the bow drill. The instrument known as the dental drill is really an improved form of bow drill, working much more rapidly. An S. S. White dental engine, provided with a suitable series of drill points, answers every purpose, and has been found especially useful in exposing fossils and minerals when covered with rock, the objects being opened with great rapidity, with little danger of injury. As shown by the author in a paper on a new method of engraving cameos and intaglios,[5] an artist could be so trained to the use of this improved bow drill as to attain the same softness and feeling developed by the old lapidarian masters.

In the ancient specimens of work, tubes from which a core has been drilled out by means of a reed and sand, revolved by the hand, were done as neatly as anything can be done, the reason being that the object was entirely drilled from end to end. This method of drilling is still practiced, except that the hollow reed is replaced by the diamond or steel drill. When a valuable stone is being drilled, a sheet of steel or thin iron tube is substituted for it. The polishing and grinding now is done on rapidly revolving disks, horizontal or lay wheels, as they are called, whereas formerly the slow process of rubbing with the hand or board or leather was perhaps resorted to. No lapidary can do finer work than that shown by the obsidian objects

[1] Proc. U. S. Nat. Mus., 1888, p. 115.

[2] Canadian Record of Science, II, No. 6, April, 1887.

[3] Pages 266-277 to 284.

[4] Pages 303-305.

[5] Trans. N. Y. Acad. Sci., III, p. 105, June, 1884; also Jewelers' Circular, June, 1884.

SERIES OF OBJECTS OF POLISHED STONE, PRINCIPALLY JADEITE AND OBSIDIAN, FROM MEXICO AND CENTRAL AMERICA.

U. S. National Museum. $\frac{5}{14}$ natural size.

from Mexico (see illustration), the labrets,[1] ear ornaments, and tubes,[2] which are even more highly polished, though no portion of the latter is thicker than one-thirty-second of an inch. An obsidian coyote head[3] in the Blake collection in the United States National Museum is a beautiful ornament, highly polished, and bored throughout the lower part. The spear points and hoes from East St. Louis and other parts of Missouri and Illinois, and beautiful sacrificial knives—notably the immense knife,[4] 18 inches in length, in the Blake collection of the United States National Museum, and the one in the Ethnological Museum at the Trocadero in Paris—show the greatest skill in chipping.

Many of the aboriginal stone objects found in North America and elsewhere are marvels of lapidarian skill in chipping, drilling, grinding, and polishing. Few lapidaries could duplicate the arrow points of obsidian from New Mexico, or those of jasper, agate, agatized wood, and other minerals found along the Willamette River, Oregon. No lapidary could drill a hard stone object truer than some of the banner stones,[5] tubes, and other objects made of quartz, greenstone, and granite that have been found in North Carolina, Georgia, and Tennessee, or make anything more graceful in form and general outline than are some of the quartz discoidal stones[6] found in these same States. These latter objects are often 4 to 6 inches, and occasionally 7 inches, in diameter, ground in the center until they are of the thinness of paper and almost transparent, and the great regularity of the two sides would almost suggest that they had been turned in the lathe. This may have been accomplished by mounting a log in the side of a tree so that it would revolve, and cementing the stones with pitch to the end of the log, as a lapidary would do to-day at Oberstein, Germany, or by allowing the shaft of the lathe to protrude through the side of the log, and cementing the stone to be turned on this. The Egyptian wood turner at work in the Rue de Caire, at the World's Fair, Paris, 1889, might, with his lathe, polish a large ornament of jade or jadeite, like the masks, idols, tablets, and other objects found in Mexico and Central America, or the jade knives from Alaska, in the United States National Museum.

Jadeite masks.—Returning to the discussion of lapidary art as manifested in the working of hard stone, plate 41 shows examples of different materials, form, uses, and localities, though all from Mexico or Central America; some specimens are obsidian, and no distinction is maintained as to the material of the others.

Fig. 111 is a mask of jadeite from an Aztec (?) grave in Mexico. It represents a crying baby. It belongs to Mr. Charles Storrs, of Brooklyn, and was exhibited at the meeting of the American Association for the Advancement of Science in 1879, by Mrs. Erminnie A. Smith. It is reported as having a specific gravity of 3.3, which, with its hardness, determines it to be jadeite. Remarking upon its art, we first see how it has been wrought by drilling and other methods of abrasion into, not simply a representation of the human face, but that it has its peculiar expression. The eyes are closed, the brows are drawn down, the nose and upper lip are drawn up, deep furrows are in the cheeks under the eyes and by the side of the nose, the contour is regular, the profile is correct and true, and besides all this, every portion of the face has been not only smoothed, but finely polished, the depths and sides of the furrows and around the eyes equally well with that of the prominent parts like the cheeks and forehead. Suggestions are made as to how some of this

[1] See fig. 117.
[2] See fig. 118.
[3] See fig. 116.
[4] See fig. 88.
[5] See figs. 100–104.
[6] See fig. 110.

was accomplished, for example, at the corners of the mouth, where the depressions were made by drilling, although the drill marks have been polished out. One is able to speak of this drilling operation with a certainty that becomes absolute, from finding it represented in a score of other specimens, wherein the corners of the eyes and mouth have been drilled, some with a solid, others with a hollow drill, the latter showing the protuberance of the core. Specimens have been found where such drilling had been utilized for the insertion of precious or colored stones. The unscientific reader will appreciate the beauty of this specimen as well as the difficulties to be overcome, when it is stated that with this and many others of the specimens herein men-

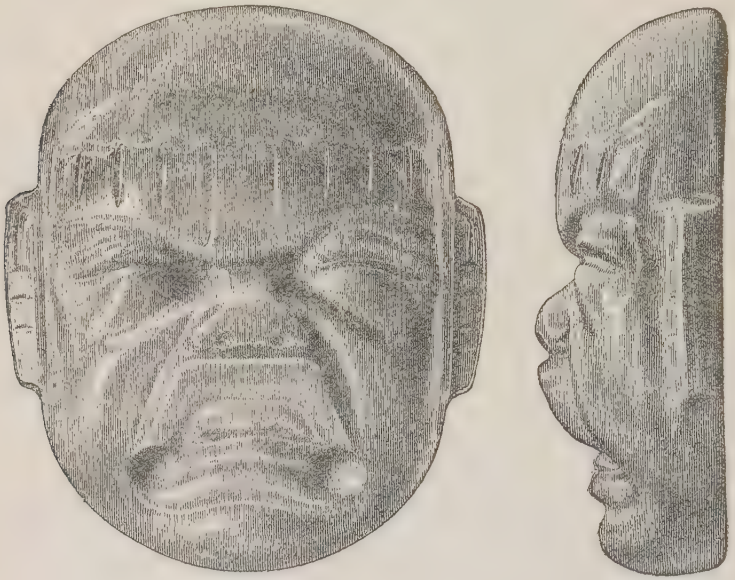


Fig. 111.

"CRYING BABY," A MASK OF JADEITE FROM AN AZTEC (?) GRAVE.

Face and edge views.

Mexico

Cast, Cat. No. 42652, U.S.N.M. Natural size.

tioned one can, without any preparation and without undue pressure, cut the glass in the cases which contain them with apparently as much ease as does the glazier with his diamond. In fact, the material stands next in hardness after the diamond. It is 9 in the scale of which the diamond is 10. These remarks in regard to hardness, drilling, and polishing apply to many of the specimens shown in plates 39, 40 and 41. There are specimens of hard stones not jade which show evidence of fine lapidary art.

Crystal skull.—Fig. 112 represents a human skull of rock crystal. Its hardness is well known. The sutures are shown, the hollow eyes are drilled out, the nose with its processes is shown, and the grinning teeth. A hole has been drilled through from the crown to the foramen

magnum. Other objects in rock crystal treated in a similar manner have been found, of which Mr. Kunz is authority for the statement that the workmanship equals anything done by the modern lapidary. Similar skulls are to be seen in the Trocadero Museum at Paris and in the Douglass collection at the Metropolitan Museum of Art, Central Park, New York. A unique specimen remarkable for its size, from the Boban collection and found in Mexico, is now owned by Mr. George H. Sisson, of New York. It is $8\frac{3}{16}$ inches in length, $5\frac{3}{8}$ inches in width, and $5\frac{11}{16}$ inches in height, and represents a human skull similar in appearance and workmanship to fig. 112. A description of one would stand for a description of the other. Another specimen (fig. 113) is a skull similar to fig. 112, but of fossilized wood, from Chichen Itza, Yucatan. The eyes are drilled with a hollow drill, the cores protruding as shown in the sketch. The teeth are represented half round or semicircular, instead of being square, as in the other cases. Fig. 114 is a rude block of obsidian 3 inches long, $2\frac{1}{4}$ inches in diameter, from Tezcuco, Mexico, with the rudiments of a human face outlined upon it. The work has been done by abrasion, a piece of obsidian or some other hard stone with the necessary angles and corners having probably served as a hammer. It is introduced here more as showing the method of procedure than as an object of art in itself. Fig. 115 is a small statuette of obsidian from Mexico, which has been fully completed. It represents a human figure seated; has been worked out to show all the members, and has then been polished as smooth as glass. Fig. 116 is the small head of a coyote or some similar animal. It is worked out in the same way as fig. 115, and is finely polished. Fig. 117 is still another object of obsidian from Mexico, representing a labret, a small hat-shaped instrument used as a lip ornament common to certain primitive peoples—the Alaskans and the Botocudos. Fig. 118 represents a small ring or band of translucent obsidian in the form of a cylinder with horizontally projecting rims. There are other similar specimens in the United States National Museum. Their use is unknown, but they

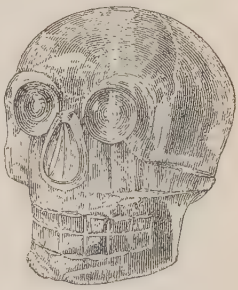


Fig. 112.

REPRESENTATION OF A HUMAN SKULL IN ROCK CRYSTAL.

Mexico.

Cat. No. 98949, U.S.N.M. Natural size.

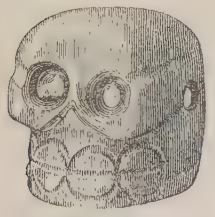


Fig. 113.

REPRESENTATION OF A HUMAN SKULL IN HARD STONE, FOSSILIZED WOOD.

Chichen Itza, Yucatan.

Cat. No. 10531, U.S.N.M. Natural size.

Fig. 114.

BLOCK OF OBSIDIAN, SHOWING FIRST STAGES OF SCULPTURING—A HUMAN FACE MADE BY HAMMERING OR PECKING.

Tezcuco, Mexico.

Cat. No. 98982, U.S.N.M. ½ natural size.

were probably ornaments. Their peculiar relation to lapidary art consists of the fine workmanship required to reduce them to their extreme thinness. They are only slightly thicker than an eggshell. This specimen is only one out of a series showing the extreme delicacy of the lapidary art with which they were made. Some of them are in the form of cylinders $\frac{7}{8}$ inch in diameter, $1\frac{1}{4}$ inches in length, the hole drilled and enlarged until the body is not more than $\frac{1}{32}$ inch, so thin as to appear almost unable to sustain itself.

Fig. 115.

STATUETTE OF OBSIDIAN, SMOOTHED AND POLISHED.

Mexico.

Cat. No. 98976, U.S.N.M. $\frac{1}{2}$ natural size.

Patu-patu.—An interesting series of jade objects the manufacture of which bears an intimate relation to lapidary art and about which there has been some discussion is the war club with various names according to the following localities: Patu-patu, or merai, in New Zealand; macana in Mexico, and slubbets in Puget Sound and Alaska. They have been made of various materials—hard wood, whalebone, copper, or bronze—but that which most concerns us here is the fact that they were many times made of some of the species of jade or other hard stone. The greatest number of these implements are from New Zealand, where they are made principally of jade or some of its varieties or of some other hard stone; yet similar implements, also of hard stone have been found in Mexico and in the western United States. The United States National Museum possesses a specimen, reported as having been dug from a mound by Capt. J. B. Aldrich in 1866. The mound was situated just south of the Arkansas River, near the thirty-eighth parallel, in Bent County, southeast Colorado. Although the report as to the finding of this specimen in Colorado was well authenticated, yet it seemed hardly sufficient to overcome the supposed universal testimony that these peculiar implements belonged to New Zealand. It was believed to be more likely that an error had been made in the report or in the identity of the implement than that an object common to New Zealand should have been unearthed in a mound in Colorado. But further examination puts a different phase upon the affair. Mr. James Wickersham, in a paper entitled "An aboriginal war club," published[1] in 1895, reports the discovery of

Fig. 116.

HEAD OF COYOTE, OBSIDIAN, SMOOTHED AND POLISHED, PROBABLY A CHARM, DRILLED FOR SUSPENSION.

Mexico.

Cat. No. 98879, U.S.N.M. Natural size.

Fig. 117.

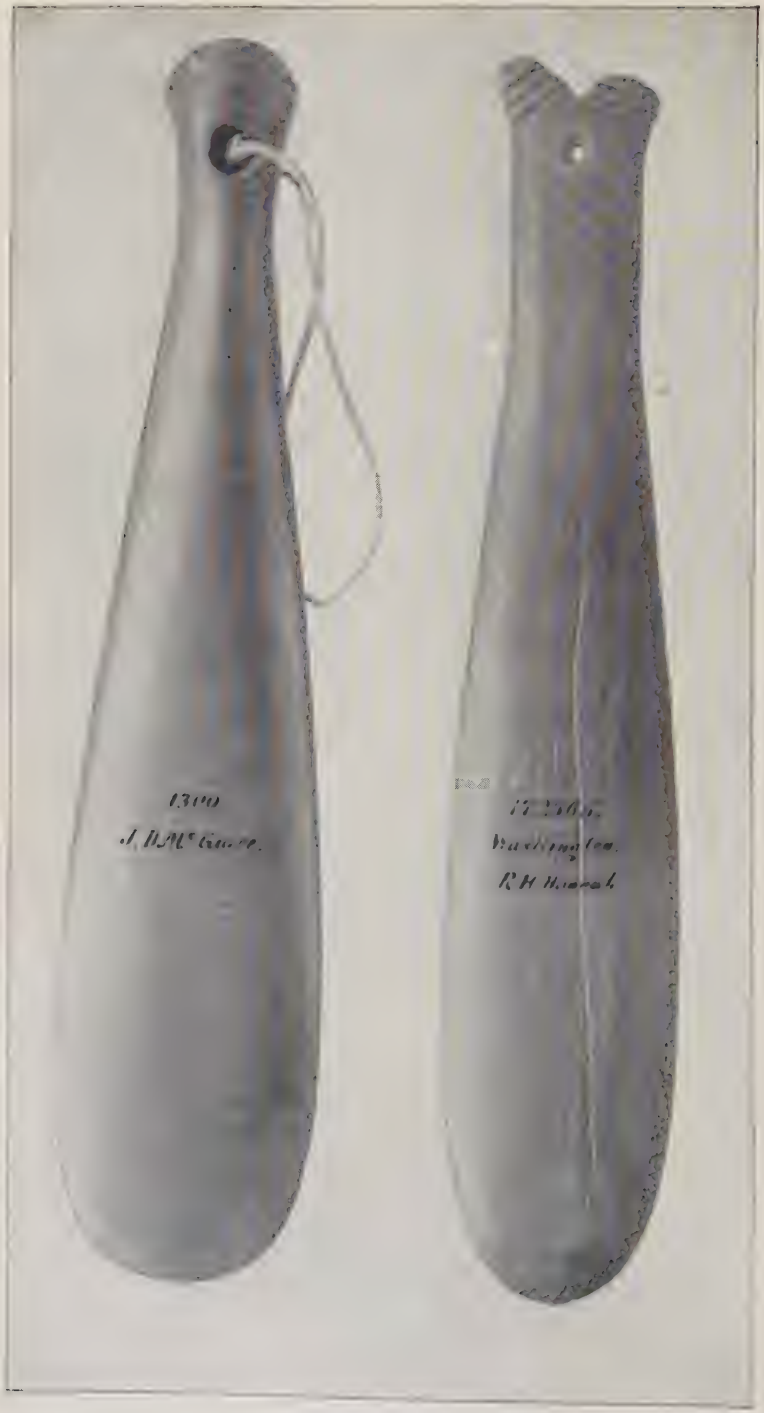
LABRET (LIP ORNAMENT) OF OBSIDIAN, SMOOTHED AND HIGHLY POLISHED.

Face and edge views.

Mexico.

Cat. No. 97302, U.S.N.M. $\frac{1}{2}$ natural size.

[1] The American Antiquarian, XVII, p. 72.



PATU-PATU FROM THE UNITED STATES, SIMILAR TO THOSE FROM NEW ZEALAND.

Cat. Nos 1300, 172565, U.S.N.M. ⅜ natural size.

a number of these implements from various parts of the American continent, and an examination verifies the fact and extends the area of their discovery over a much larger portion of the United States. Plate 42 represents two of these implements now in the possession of the United States National Museum in addition to the one received from Captain Aldrich. The best finished one[1] is of the standard shape, size, and appearance, and a reproduction of the Aldrich specimen, as well as many of those from the Pacific coast, from Mexico, and almost all the finished ones from New Zealand, would be but a repetition of this. It is therefore considered useless to duplicate the representation.

The history of the specimen (No. 1300) is given by Mr. J. D. McGuire, the present owner, as follows:

> It was given to me by a gentleman who had lived long in the West. The story he told me was, that while on a hunting trip (I think in California, though of this I am not positive) a companion who had left camp in the morning returned with the implement in his hand and said he had found two dead Ute Indians, and to the wrist of one was attached this stone by the piece of cord yet on it.

A specimen from the State of Washington is shown on plate 42 (Cat. No. 172565, U.S.N.M. It was found by Mr. R. H. Hannah, 3 miles east of Olympia, while clearing the ground of stumps. The attention of the author being attracted to the subject, he discovered that the number of specimens found within the United States similar to those in plate 42, especially those like No. 172565, U.S.N.M., has increased considerably and their geographic area greatly extended. In view of this, it has to be admitted that this is an implement of the North American savage; whether historic or prehistoric may be left undecided.[2]

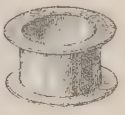


Fig. 118.

RING OR BAND WITH PROJECTING RIM, TRANSLUCENT OBSIDIAN, EXTREMELY THIN AND HIGHLY POLISHED.

Mexico.

Cat. No. 98914, U.S.N.M. Natural size.

This art work may not be manifest upon a cursory examination, but it must be considered that many or most of these specimens are some of the varieties of jade, with a hardness equal to that of glass and exceeded only by the diamond, and that they are made straight, true, entirely symmetrical both sidewise and edgewise, with rarely a flaw or defect, and that when thus reduced to form they are smoothed and polished as finely as a piece of jewelry intended for a lady's wear.

SCULPTURE.

EUROPE.

The art of sculpture in Neolithic times had an exceedingly wide range. In Europe it had scarcely an existence worthy the name. As before remarked, the principal ornaments employed during this epoch were

[1] Loan collection, Cat. No. 1300, U.S.N.M.

[2] For further argument upon the subject reference is made to Wickersham's paper; to Bancroft's "Native Races," IV, p. 560; and to Prescott's "Conquest of Mexico," III, pp. 82, 87, 99, and 101, plates 25–30.

geometric designs, and representations of living or real objects were rarely attempted. A series of Neolithic ornamentation is shown in plates 19 and 20. These are mostly on pottery, only four being on stone and to be classed as sculpture. There seem to have been two geographic areas in France affecting this kind of art, the first around the Bay of Quiberon, department of Morbihan, the second in the department of the Marne, northern central France.

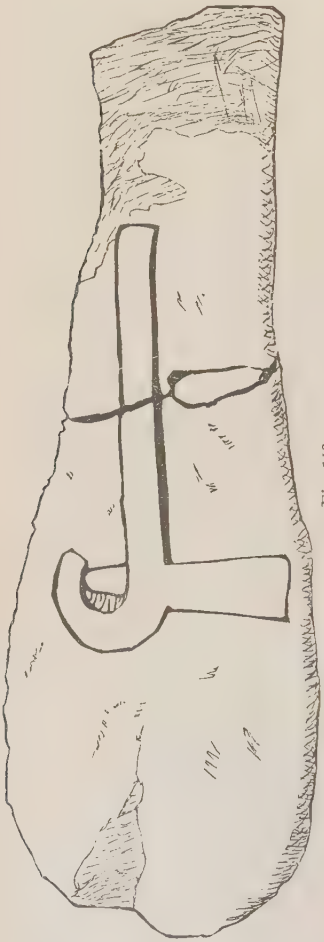


Fig. 119.

FIGURE OF A POLISHED STONE HATCHET WITH HANDLE, ENGRAVED ON SIXTH SUPPORT OF THE DOLMEN OF GAVR'INIS.
$\frac{1}{6}$ natural size.

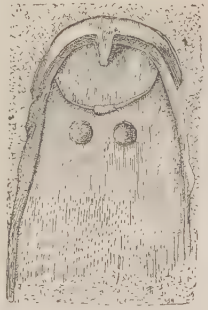
The four specimens referred to are all from the first-mentioned area. They are on plate 20, figs. 16, 21, 23, and on plate 19, fig. 15.

Plate 19, fig. 15, represents the sculpturing on one of the supports of the dolmen of Petit-Mont, at Arzon. The principal designs or lines are in waves and U-shaped. The only one which could have been intended to represent any known or possible object are two human footprints, and these do not appear to signify anything more than is apparent. Plate 20, fig. 23, represents a cartouche, engraved or sculptured on a support of the dolmen of Pierres-Plates at Lochmariaker, Morbihan. Plate 20, fig. 21, is a representation of one of the supporting stones of the dolmen of Gavr'Inis. The author has visited this dolmen and has seen the sculptured stones in place. They are thin sandstone slabs, about 6 feet high, 4 feet wide, and form the sides of both the crypt and the entrance, there being probably forty in all, similar in many respects to that shown in the figure, although this has been chosen as the best representative. The surface is rough; the sculpturing has been done with the hammer by pecking or battering—*martelage*, the French call it. Plate 20, fig. 10, is a representation of the covering stone of the dolmen at Baker Hill, Rosshire, Scotland, taken from "Archæic Sculpturings," by Mr. J. Y. Simpson. These will be perceived at once to consist principally of cup stones, some with concentric rings, others connected by a slight

groove. To go into the subject of cup stones as a branch of sculpture would lead us too far afield.[1]

Other dolmens have been found with marks made thereon, but no meaning is ascribed to them beyond possibly that of a stone hatchet handled, or some similar implement. Fig. 119 is a representation of one of these stone hatchets handled, engraved on the sixth support of the dolmen of Gavr'Inis. Various petroglyphs have been found on the dolmens in the immediate neighborhood—Tables-des-Marchands, Mané-H'röeck, Kercado, Petit-Mont, Mein-Drein, Be-er-Groah; also on the dolmens of Grosse-Perrotte (Charente), and Trou-aux-Anglais (Seine-et-Oise).

M. L. Davy de Cussé made an extensive investigation and report upon all marks and signs engraved or cut on the megalithic monuments, whether dolmens or menhirs, in the department of Morbihan.[2]



Figs. 120, 121.
RUDE SCULPTURES OF THE HUMAN FORM ON SUPPORTS OF DOLMENS.
Height 4 feet (?).
Marne, France.
Cartailhac, La France Prehistorique, figs. 105, 106, pp. 242, 243.

In none of these sculptures has there ever been an attempted representation of living things, except in the few cases mentioned. This statement would have been true for all France until within a few years past, but because of recent discoveries it requires modification. There have been found on some of the stone supports or tables of the dolmens, rude and apparently inchoate or malformed figures which, by assembly and comparison, are decided by investigating archæologists to have been representations of the human form. Baron Joseph de Baye and M. Adrien de Mortillet have been the most ardent and successful investigators in this regard, though MM. Cartailhac and Reinach should not be forgotten. Fig. 120 represents one of these supports of a dolmen in the department of Marne. Fig. 121 is another from the same department.[3]

These are believed to have been the earliest prehistoric sculptures in stone or on stone monuments in France. They were bas-reliefs on the

[1] Reference is made to the "Contributions to North American Ethnology," V, (U. S. Geog. and Geol. Survey), entitled "Observations on cup-shaped and other Lapidarian Sculptures in the Old World and in America," by Dr. Charles Rau.

[2] Recueil des Signes Sculptés sur les Monuments Mégalithiques du Morbihan, Vannes, 1865–66.

[3] Cartailhac, La France Préhistorique, pp. 242, 243, figs. 105, 106; Baron Joseph de Baye, Archéologie Préhistorique, 1880, plate 1; Solomon Reinach, l'Anthropologie, V, p. 22, figs. 14, 15.

supports of the dolmens in the Grottos of Coizard in the valley of Petit-Morin (Marne).

Similar rude sculptures have been found in other parts of France, which have been collated by M. Cartailhac in the work above cited, which collation has been extended in his description of the sculptures of the dolmen d'Epone (Seine-et-Oise).[1]

The collation of sculptures of the human form was continued by M. Solomon Reinach.[2] It is not deemed necessary to here enlarge on the subject in greater detail. Those interested can follow it in the authorities cited.

Plate 43 represents four of a series of eight discovered by Abbe Hermet and drawn and described by M. Cartailhac.[3] The figures are the best of the series and have the nearest approach to human beings. Some have legs and feet represented below the girdle, but shorter, narrower, straighter, and closer together, until it becomes an even chance whether they may not have been intended to represent the fringed ends of a scarf. M. Gabriel de Mortillet has reported and figured by photograph the same statues.[4]

M. Solomon Reinach figures and describes the same,[5] and says: "I find it inexplicable that these should ever have been qualified as Neolithic. The accessories which distinguish them can respond only to an origin in the time of metal, probably of bronze."

Other sculptures near Paris are reported by M. Adrien de Mortillet.[6]

NORTH AMERICA.

Aboriginal sculptures in North America are quite different from those of Europe. The Neolithic peoples of the United States, whether North American Indians or their ancestors or predecessors, made many pieces of sculpture in stone, wood, or pottery, representing animal as well as human faces and forms. Most of these were rude, though they sometimes presented the subject in a bold and marked manner.

In stone.—The sculptures in stone exhibited a skill in art inferior to that displayed in flint chipping, drilling, and polishing. The ordinary decoration of objects was not, as in Europe, confined to geometric designs. It appears as though the aboriginal American artist gave his fancy or imagination free rein, was not hampered by rules of art nor deterred from the most daring attempts by any imaginary mechanical or technical difficulty. It is true that he made designs by sculpturing on flat surfaces, sometimes on stone, but many more times on pottery. Still, on numerous occasions he essayed the highest flights of

[1] L'Anthropologie, 1894, V, pp. 147–156.

[2] La Sculpture en Europe, pp. 25–31, 172–185, and 288–305.

[3] L'Anthropologie, 1892, III, No. 2, p. 222.

[4] Revue Mensuelle de l'École d'Anthropologie, troisieme Année, X, 15 Octobre, 1893, p. 321.

[5] L'Anthropologie, V, pp. 26, 27, figs. 22, 23.

[6] Bulletin de la Société d'Anthropologie de Paris.

FOUR STATUES, SANDSTONE, RUDELY REPRESENTING THE HUMAN FIGURE FOUND IN 1890, AVEYRON, FRANCE.

Average height, 4 feet.

Cartailhac, l'Anthropologie, 1892. III, No. 2, p. 222; G. de Mortillet, Revue Mensuelle de l'Ecole d'Anthropologie, October 15, 1893, p. 316.

HUMAN FIGURE, STONE.
Height, 21½ inches; weight, 56 pounds.
Found in 1888 near Stilesboro, Bartow County, Georgia.
Collection of A. J. [illegible] Museum [illegible]

art, and sought to represent the human form as well as the face, by sculptures done in the round.

Plate 44 represents a human figure sculptured in stone. Its height is 21½ inches, and its weight 56 pounds. It is complete and perfect, without a break or damage. It was found near Stilesboro, Bartow County, Georgia. It is seated, the legs are represented in the solid stone as though crossed, but in an impossible manner, not being more than one-third the length of the arms. The only indications of sex are the mammæ, which are small dots, indicating the male. The material is fine-grained sandstone, and the entire figure has been worked out of the solid. It has apparently been done altogether by battering or pecking into form and then rubbed or scraped smooth. It is not polished. The shape of the head and the general appearance of the features are typical, to a degree at least, of the aboriginal art throughout the southern United States. The head rounded over the top of the skull, broad across the middle, with projecting ears; the eyebrows are prominent but made so by the sunken eyes. The eyes are oval, and their orbits on the same plane. The nose is straight, without much appearance of nostrils. The chin is short and rounded, the under jaw very small. The most noticeable characteristic of this specimen, as it is of many others from the same region, and that which would seem more than anything else a local type of human sculpture, is the mouth and the mode of treating it. The mouth is open, being represented principally by a cavity which has been excavated to a considerable profundity. The lips are strong and protrude greatly. They are not divided into upper and lower lips, but are continuous around the orifice so as to form an oval ring, the interior of which is the cavity representing the mouth. Neither the teeth nor the tongue are shown, though a ridge in this specimen might pass for teeth or gums. The neck is fairly well formed; the shoulders are square, but with the arms, are considerably exaggerated in size. The body under the armpits is less than half the width across the shoulders. From the armpits to the legs the body is a solid cylindrical mass of stone, without indication of thorax, waist, or abdomen. The hands and arms, especially the former, are extremely rude, the fingers being only indicated by scratches. The head as is represented, was thrown well back, the chin being somewhat in the air. The upper part of the face as well as the forehead, retreated considerably; the head was short (brachycephalic), though this might have resulted from the action of the artist without being any indication of race. The occiput was furnished with a knot 3½ inches in diameter and 1½ inches elevation. This might represent hair, although there is nothing particular to indicate it. The statue has none of the fillet, as it is called by Professor Thomas, which communicates from the back of the head downward.

Fig. 122 represents a human image of crystalline limestone. It is more than 20 inches in height and weighs 37 pounds. It was dis-

covered in a cave near Strawberry Plains, 16 miles east of Knoxville, Tennessee. The body is rudimentary. The face is fairly well represented and shows the two peculiarities of the sculptures of that southern region, that is, the retreating forehead and the ring-like mouth.

Fig. 123 represents two views, back and front, of a rude sculpture of the female figure. It is of yellowish sandstone, is from Williamson County, Tennessee, and is about 8 inches high. Like the former specimen, the body and head are rude, being little more than indicated. The mammæ show it to have been intended for a female figure. The arms are only indicated on the stone and are not separated from the body. The figure is seated or kneeling, the hands upon the knees. The spinal column is prominently indicated. There is the same sloping face and retreating forehead, with the ring-mouth as before remarked.

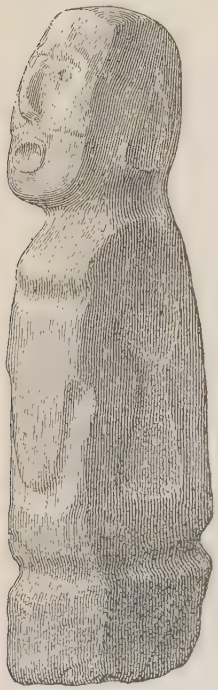


Fig. 122.
HUMAN IMAGE, OF CRYSTALLINE LIMESTONE.
Height, 20 inches; weight, 37 pounds.
Cave, Strawberry Plains, near Knoxville, Tennessee.
Cat. No. 6462, U.S.N.M. $\frac{1}{6}$ natural size.

Fig. 124 is another representation of a female figure, 15 inches high, of yellowish sandstone, from the same locality (Williamson County, Tennessee). The body is much better represented than the former, and as a work of art is more complete and better finished. The figure is kneeling with the hands crossed and pressing against the abdomen. The occiput is provided with a knot through which is a perforation, as though for suspension, although its actual use is unknown.

Prof. Cyrus Thomas[1] published an investigation into the geographic extension in the Southern States, of sculptures with the peculiar fillet extending from the head down the back, and concludes that "the conventionalized form is indicative of local origin." His attention in this regard was first arrested by the examination of a small stone image found in a box-shaped stone grave at Castilian Springs, Sumner County, Tennessee, sent to the Bureau of American Ethnology by Mr. S. S. Bush, of Louisville, Kentucky.

Fig. 125 represents two views of a cast of this image (Cat. No. 175644, U.S.N.M.). It is to be remarked that this image, while it has the retreating forehead, has no semblance of the ring mouth heretofore noticed. Though reported to have been made of stone, the photographs from which these figures were made was a clay model or plaster cast, and the eyes and nose differ widely from the stone images of that locality, being almost exactly like those made of clay and which abound on the pottery bowls and bottle vases.

[1] Amer. Anthrop., IX, December, 1896, p. 404.

STONE STATUE, FRONT AND SIDE VIEWS.

Etowah mounds, Bartow County, Georgia. Original in Tennessee Historical Society collection. Cast, Cat. No. 61257, U.S.N.M. $\frac{1}{8}$ natural size.

Plate 45 represents two views of a stone statue, a cast of which is in the United States National Museum. The original is in the Tennessee Historical Society collection. The following description is given of this specimen by Col. Charles C. Jones:[1]

Fig. 123.

HUMAN STATUE (FRONT AND BACK VIEWS), SANDSTONE.

Height, 8 inches.

Franklin, Williamson County, Tennessee.

Cat. No. 19934, U.S.N.M.

It was plowed up on Colone Tumlin's plantation (near Cartersville, Georgia), near the base of the large tumulus (Tumlin's Etowah Mound). * * * It is a female figure in a sitting posture. The legs, however, are rudimentary and unformed. Its height is 15¾ inches, and its weight 33½ pounds. Cut out of a soft talcose rock, originally of a grayish hue, it has been in time so much discolored that it now presents a ferruginous appearance. Below the navel, and enveloping the buttocks and rudimentary thighs, is a hip dress, ornamented both on the left side and behind by rectangular, circular, and irregular lines. The ears are pierced, and the head is entirely bald. In the center of the top of the head a hole has been drilled half an inch in depth, and five-tenths of an inch in diameter. This probably formed the socket in which some head ornament was seated. That ornament, whatever it was, had fallen out and was lost when the image was found. Springing from the back of the head and attached at the other end to the back midway between the shoulders, is a substantial handle by means of which this image could have been securely suspended or safely transported from place to place. The mammary glands are sharply defined and maidenly in their appearance. The ears, hand, and navel are rudely formed. The impression conveyed is that of a dead, young, flat-head Indian woman. Unfortunately the left arm has been broken off, but otherwise this idol is in a state of remarkable preservation.

Fig. 124.

STATUE OF FEMALE FIGURE.

Height, 15 inches.

Yellowish sandstone. Williamson County, Tennessee.

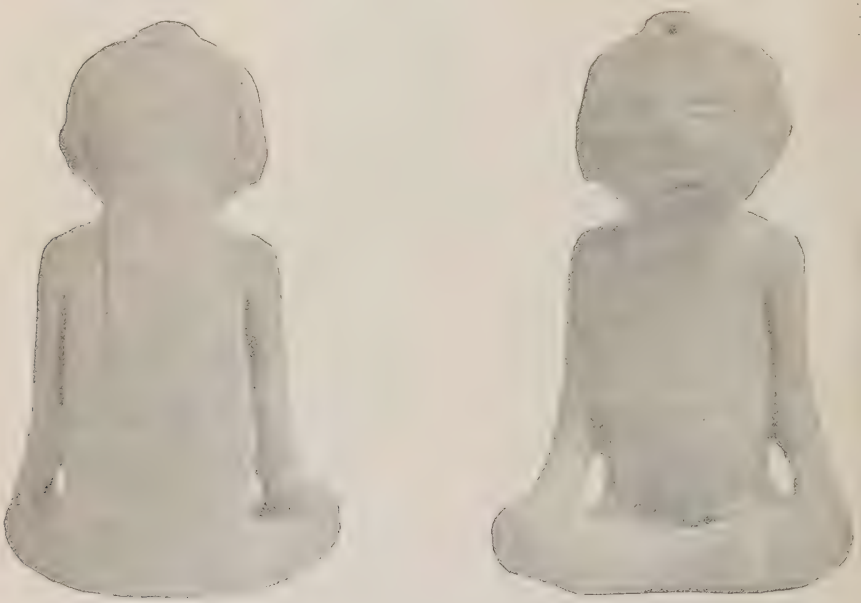
Cat. No. 19932, U.S.N.M.

It appears, also, from Colonel Jones, that another statue in the possession of Colonel Tumlin, in 1859, had been plowed up near the same mound. Colonel Jones reported that he saw it, and he gives the following description:[2]

It was of coarse dark sandstone, and it was 12 inches high. It consisted of a male figure in a sitting posture. The knees were drawn up almost on a level with the chin, the hands resting upon and clasping either knee. The chin and forehead were retreating, the hair gathered into a knot behind, the face upturned, and the eyes angular. Unfortunately this image was lost or destroyed during Sherman's march through Georgia in 1864.

[1] Antiquities of the Southern Indians, pp. 432, 433. [2] Page 432.

Plate 46 shows three stone statues, all of which are represented in the United States National Museum by casts. The originals (Cat. Nos. 30251, 30252, U.S.N.M.) are in the Louisville Public Library. They are of sandstone and were found within the State, the precise locality being uncertain. The third statue (Cat. No. 61259, U.S.N.M.) is from the same general locality, but, like the former, the details concerning its finding are unknown. Some of these have been broken, possibly in the original; in others the casts may be imperfect or broken, but enough remains to make it apparent that they were the work of the same class of artists



a *b*

Fig. 125.

STONE SCULPTURE OF HUMAN FIGURE, FRONT AND BACK VIEWS.

From a stone grave, Castalian Springs, Sumner County, Tennessee.

Height, 3⅛ inches.

Collected by S. S. Bush, of Louisville, Kentucky. Prof. Cyrus Thomas, American Anthropologist, December, 1896, p. 404.

and represented the same peoples. They are alike in their general features, the shape of the head, the chin in air, retreating forehead, rounded skull, the fringe of hair, the broad face, prominent ears, overhanging eyebrows, Roman nose, protruding lips, and ring-shaped mouth. Two of them are females, the third a male. They are all squatting, or possibly only intended to represent the trunk of the human figure. All of them are flat on the bottom and able to sit straight and alone. Fig. 126 represents two views of a stone statue. It is 14½ inches high and is of compact limestone. It is from a mound on Long Island, Roane County, Tennessee, and was excavated by Mr. J. W. Emmert, under

THREE STONE STATUES.

Kentucky.

Originals in Louisville Public Library.

Casts, Cat. Nos. 30251-52, 61259, U.S.N.M. ¼ natural size

Professor Thomas, of the Bureau of Ethnology. A report of its discovery is in the Twelfth Annual Report of the Bureau of Ethnology, 1890–91, page 359, and it is fig. 240. This statue, like the others, represents only the trunk, and is capable of sitting alone. The arms are outlined with hands on the knee or lap. The peculiarities of the sloping face and receding forehead, with the head thrown back, are mani-

Fig. 126.

STONE STATUE, FRONT AND SIDE VIEWS.

Height, 14½ inches.

Mound No. 3, Long Island, Roane County, Tennessee.

Cat. No. 131781, U.S.N.M. Thomas, Twelfth Ann. Rept. Bur. Ethnol., 1890-91, p. 361, fig. 240.

fest at a glance. The sex of the figure is not represented, but the hair (?) shown on the back part of the head is in a firm and solid knot resembling a chignon. There is no appearance of a fillet or attachment to the back. The general character of the individual represented is much the same as the former. The eyebrows are made in the same manner, the appearance of hair around the forehead is the same, and the nose s the same shape, but the ring mouth does not appear.

Plate 47 represents a statue of gray sandstone from Williamson County, Tennessee. It was found by Dr. Frost, of Nashville, and belongs to the collection of the Tennessee Historical Society. It represents a different type of man or a different style of art. The figure is in a squatting or kneeling position, the left knee is brought to the ground, and the figure is sitting on the left foot. The right leg is brought forward, the foot being flat upon the ground, the knee in its natural position, the right arm and body resting on it. All this forms a base by means of which the statue can sit alone. The face is round, moon-like, the eyes much the same, giving it a wild and staring expression. The nose is prominent, but broad and flat, while the lips are protruding and heavy. The workmanship is crude, and it seems doubtful if it was ever intended as a portrait bust or to represent any particular individual or tribe. The entire statue has been wrought out of the solid, and apparently no part of the original surface was ever utilized. It has peculiarities of physiognomy, different from the ordinary appearance of the Indian, and resembles the negro, yet the ensemble of the statue bears no relation to the negro. The appearance of the face resembles somewhat the Perrine statue from Union County, Illinois, made in pottery and represented in fig. 132.

A much mutilated and defaced statue of sandstone was found in a mound in Tennessee and deposited in the United States National Museum by Dr. John E. Younglove, of Bowling Green, Kentucky. The lower part is broken, and its original condition is unknown. Enough of it remains to show the shape of the head, the indication of the hair, the breadth of the face, and that all these are of the same type as the examples from the same locality. The ears are well represented, and are much more elaborate than in any specimen yet examined. This head, if taken alone, would have every appearance of being a bowlder, the surface of which had been sculptured as shown, but an examination of the head, taken in connection with the shoulders and breast, shows that it has been worked out of a larger piece. The fracture, both of the trunk and that by which the nose and mouth was destroyed, was ancient, and the broken surface appears to be equally as old as any of the sculptured portion. (Cat. No. 141015, U.S.N.M.)

This statue is peculiar in its appearance and unlike those from the Southern States; the only one bearing any similarity to it which has come to the notice of the author is that shown by Thruston.[1]

Other specimens from the region of Tennessee and Kentucky are in private and State or municipal collections in the States mentioned, but enough has been shown to indicate a particular style of sculpture or a certain sameness in its production. Whether this arises from a peculiarity of the artists in that they were all taught one way, or had

[1] "Antiquities of Tennessee," 2d ed., p. 104, fig. 25.

STATUE OF GRAY SANDSTONE.

Height, 13 inches.

Williamson County, Tennessee. In Tennessee Historical Society collection.

Thruston, Antiquities of Tennessee, p. 104.

TWO HEAD-SHAPED VASES.

Pecan Point, Arkansas.

(1) Cat. No. 94398; (2) Cast, Cat. No. 94398*a*. Holmes, Fourth Ann. Rept. Bur. Ethnol., 1882–83, pp. 407–409, figs. 420–423. ⅛ natural size.

TWO HEAD-SHAPED VASES, ONE A DEATH MASK, THE OTHER NOT
U. S. National Museum.
$\frac{1}{3}$ natural size.

adopted a given style, or whether the individuals represented were alike and had, in fact, the peculiarities of form and feature depicted by the sculptor, is unknown. A critical and extended examination and comparison might furnish means for determination.

The localities where these sculptured peculiarities belong are principally through the southern tier of States, extending from the Atlantic Ocean to the Mississippi River.

In pottery.—It is now proposed to investigate sculpturing, or perhaps the better term is modeling, in pottery. These specimens belong to the same general locality as the stone statues, except that the former seem to cross the Mississippi River and extend to the north into Missouri and Illinois. The first to claim our attention, because of their peculiarity and rarity, are the head-shaped vases or death masks principally from Arkansas. (Plates 48, 49, figs. 129, 130.) Professor Holmes,[1] speaking of these vases, says:

> Up to the present time I have met with but eight of the curious head-shaped vases. All were obtained from the vicinity of Pecan Point, Arkansas, and, like other vessels, have been associated with human remains in graves or mounds. It is true that in all cases the bones of the dead have not been found, but this only indicated their complete decay. The question as to whether or not these vases were made exclusively for sepulchral purposes must remain unanswered; there is no source of information upon the subject. Such a purpose is, however, suggested in this case by the semblance of death given to the faces.
>
> The finest example yet found is shown in fig. 420 [our plate 48, fig. 1]. In form it is a simple head 5 inches in height and 5 inches wide from ear to ear. The aperture of the vase is in the crown, and is surrounded by a low, upright rim, slightly recurved. The cavity is roughly finished and follows pretty closely the contour of the exterior surface, excepting in projecting features, such as the ears, lips, and nose. The walls are generally from one-eighth to one-fourth of an inch in thickness, the base being about three eighths. The bottom is flat, and takes the level of the chin and jaws.
>
> The material does not differ from that of the other vessels of the same locality. There is a large percentage of shell, some particles of which are quite large. The paste is yellowish gray in color and rather coarse in texture. The vase was modeled in the plain clay and permitted to harden before the devices were engraved. After this a thick film of fine yellowish-gray clay was applied to the face, partially filling up the engraved lines. The remainder of the surface, including the lips, received a thick coat of dark-red paint. The whole surface was then highly polished.
>
> The illustration will convey a more vivid conception of this striking head than any description that can be given. The face can not be said to have a single feature strongly characteristic of Indian physiognomy. We have, instead, the round forehead and the projecting mouth of the African. The nose, however, is small and the nostrils are narrow. The face would seem to be that of a youngish person, perhaps a female. The features are well modeled, and are so decidedly individual in character that the artist must have had in his mind a pretty definite conception of the face, as well as of the expression appropriate to it, before beginning his work. It will be impossible, however, to prove that the portrait of a particular personage was intended. The closed eyes, the rather sunken nose, and the parted lips were certainly intended to give the effect of death. The ears are large, correctly placed, and well modeled. They are perforated all along the margin, thus revealing a

[1] Fourth Annual Report of the Bureau of Ethnology, 1882–83, pp. 407–410.

practice of the people to whom they referred.[1] The septum of the nose appears to have been pierced, and the horizontal depression across the upper lip may indicate the former presence of a suspended ornament.

* * * * * * *

It will be well to observe that upon the forehead, at the top, there is a small perforated knob or loop. Similar appendages may be seen upon many of the clay human heads from this valley. A Mexican terra-cotta head now in the museum at Mexico has a like feature, and, at the same time, has closed eyes and an open mouth.

* * * * * * *

All of these heads, including also some of those in the National Museum, are much alike in conception and execution.

This fact will be forcibly impressed upon the mind by a study of fig. 423 [our plate 48, fig. 2], which represents a specimen recently exhumed at Pecan Point by agents of the Bureau of Ethnology. In size, form, color, finish, modeling of features, and expression this head closely resembles the one first described. The work is not quite so carefully executed, and the head has probably not such pronounced individuality. The curious device that in the other examples appeared near the left eye here occurs on both sides. The lower part of the face is elaborately engraved. Three lines cross the upper lip and cheeks, reaching to the ear, a band of fret-like devices extend across the mouth to the base of the ears, and another band filled in with oblique reticulated lines passes around the chin and along the jaws. The ears are perforated as in the other case, and the septum of the nose is partially broken away as if it had once held a ring. A perforated knob has occupied the top of the forehead as in the other case. The face is coated with a light yellowish-gray slip, and the remainder of the surface is red.

Mr. F. S. Dellenbaugh, who combines the archæologist with the artist, has published[2] some observations and conclusions concerning this specimen (plate 48, fig. 2). He begins his paper with the declaration, conceded as true, that the North American aborigines have not been successful in depicting the human face. It might be added that they have been no more successful in depicting the human form. He then declares that the excellence of these two or three specimens is far beyond the ability of the aboriginal sculptor as shown in all other specimens, and gives it as his opinion that these were death masks.

Soft clay was pressed upon the dead features, and when sufficiently dry it was removed and other soft clay thinly pressed into the mold obtained. The mask thus made was built upon until the jar was completed.

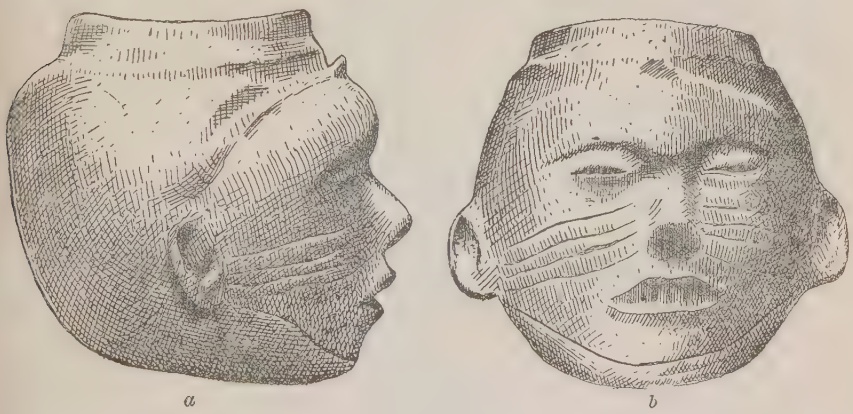
He declares Mr. Holmes's theory of a free-hand sculpture to have been an impossibility. He thinks it to have been taken in the manner suggested from "a young redskin somewhat distorted by disease and death. The age might be anywhere from 10 to 16, if a male, and 14 to 20 if a female." He is of opinion (again differing from Mr. Holmes) that the perforations through the knob on the forehead, and those in

[1] Some of the tribes on the Northwest Coast have a custom of perforating the rim of the ear in a manner similar in appearance to these. Strands of red woolen yarn are drawn in and tied, which hang almost to the waist. Models of these are in the American Museum of Natural History, Central Park, New York. It is not suggested that there was any relation between the two.

[2] Amer. Anthrop., February, 1897, X, p. 49.

the rims of the ear, were intended for suspension. He gives comparative measurements of one of these vases with two white boys, a white man and woman, and shows the general accuracy of size, form, and feature.

Plate 49, figs. 1, 2, represents two of these head-shaped vases, one of which appears to be a death mask and the other not. They belong to the Morris collection, and were on display at the Tennessee Centennial Exposition, Nashville, 1897, where the author obtained a photograph. Fig, 127 *a*, *b*, represents a head-shaped vase, front and profile views, believed to be a death mask. It was found by Mr. C. W. Riggs while excavating a mound on the St. Francis River, Arkansas. The features are represented in a natural manner, such as is not known in free-hand sculpture. The decorations of the face, like the foregoing illustrations, have been done after the withdrawal of the clay from the mould. The



a *b*

Fig. 127.

HEAD-SHAPED VASE DEATH MASK, FRONT AND SIDE VIEWS.

Thruston, Antiq. Tenn., 2d ed., 1887, p. 94, fig. 20. ⅓ natural size.

eyes have been slightly opened, the nostrils and teeth are represented by incisions impossible to have been made before, and the same is true with the decorations on the cheeks and with the ears. Fig. 128 is a head-shaped vase, not a death mask, of the red pottery of Arkansas. It was obtained from a mound in the vicinity of Little Rock, and forms part of the collection of Mr. Thibault. The United States National Museum possesses another head-shaped vase (Cat. No. 91299) similar to fig. 128 but still smaller.

These head-shaped vases divide themselves into two distinct groups. The specimens forming the first group are deaths masks, as becomes more and more evident the more the objects are studied; the other group, while of the same general form as the first, the human head being represented, has the face and features wrought upon it free hand, as in sculpturing, without the aid of a mold or cast. The author does

not pretend to any special knowledge on this subject, but believes that a comparison between these two groups will show the correctness of these conclusions.

The next to be noticed are from the same general locality, and are what have been called "effigy bottles." Professor Holmes[1] makes the following observations concerning them:

These aboriginal potters dealt with the human figure in a bold manner for savages. They were evidently capable of representing many creatures with accuracy, but preferred grotesque or conventional forms. A man or a woman is generally modeled with a large body and a curious hunched back, the vertebræ appearing along the prominent ridge. The shoulder blades are usually shown with anatomic distinctness, if not with precision; the arms are long and slender, and the hands rest upon the knees or sides. The position assumed is mostly that of kneeling or squatting, the feet being doubled up beneath and united with the bottom of the vessel. These effigy vases are numerous and greatly vary in size and color. They are mostly of the dark red, or in red and white figures, some of which represent parts of the costume, others emblematic devices. * * * The knees, calves, ankles, and various parts of the feet are indicated with an approach to accuracy. The bottom of the vessels are flat, so as to enable them to stand alone, and the legs modeled in low relief are shown thereon.[2]

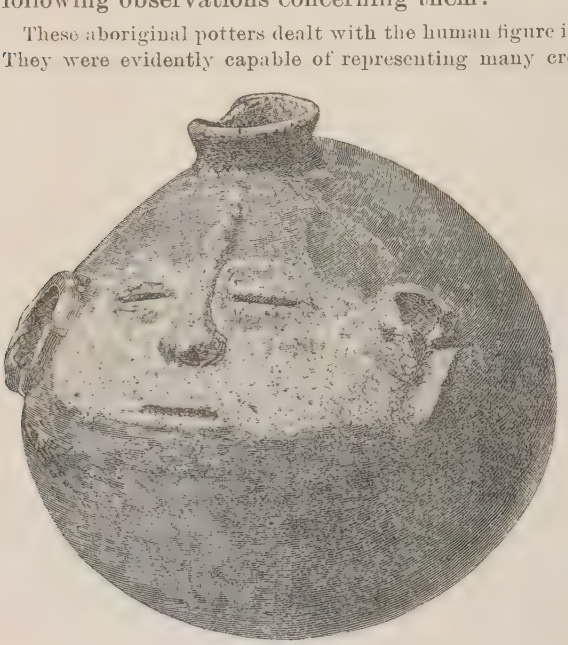


Fig. 128.

HEAD-SHAPED VASE.

Pecan Point, Arkansas.

Cast, Cat. No. 87721, U.S.N.M. Holmes, Fourth Ann. Rept. Bur. Ethnol., 1882–83, p. 410, fig. 424. $\frac{2}{3}$ natural size.

Fig. 129 represents an effigy vase from Arkansas. The general position of the body will be understood by an inspection of the figure. The mouth of the bottle is at the back of the head. One is to remark the peculiar representation of the face and features, and their similarity with some of those already described. The head is thrown back as in the foregoing, the chin is in air, while the features, nose, eyes, and mouth are much the same. Fig. 130 represents another effigy bottle, also from Arkansas, bearing the same peculiarities. Both these have the retreating forehead, the round face, broad and high cheek bones, the framing of hair around the edge of the forehead—in fact so great a similarity in all these little things as to indicate the same

[1] Fourth Annual Report of the Bureau of Ethnology, 1882–83, p. 423.

[2] Idem., fig. 453, *a*, *b*, *c*, p. 425.

Fig. 129.

EFFIGY BOTTLE, FRONT AND SIDE VIEWS.

Arkansas.

Holmes, Fourth Ann. Rept. Bur. Ethnol., 1882–83, p. 426, figs. 454, 455. ⅓ natural size.

Fig. 130.

EFFIGY BOTTLE.

Arkansas.

style of art and the same method of representing the human face and form.

Plates 50 and 51 are further representations of the human face and form in these effigy bottles. They all come from Tennessee, and show the various styles of bottles and types of the pottery sculptures of the human face. The human form is not supposed in these to be accurately represented, but is highly conventionalized in order to accommodate itself to the utilitarian purpose of the bottle. These all come from stone graves in Tennessee, and most of them from the neighborhood of Nashville, and are represented one-third actual size.

Another style of pottery vessel belonging to the same geographic area, though extending farther north, is the bowl with a handle representing a human or animal form. One of these (fig. 131, two views) was dug from a mound in Marshall County, Iowa. Although the face is grotesque, the nose being exaggerated, yet it bears the family resem-

Fig. 131.

POTTERY BOWL, FRONT AND SIDE VIEWS. HANDLE REPRESENTING HUMAN HEAD.

Mound, Marshall County, Iowa.

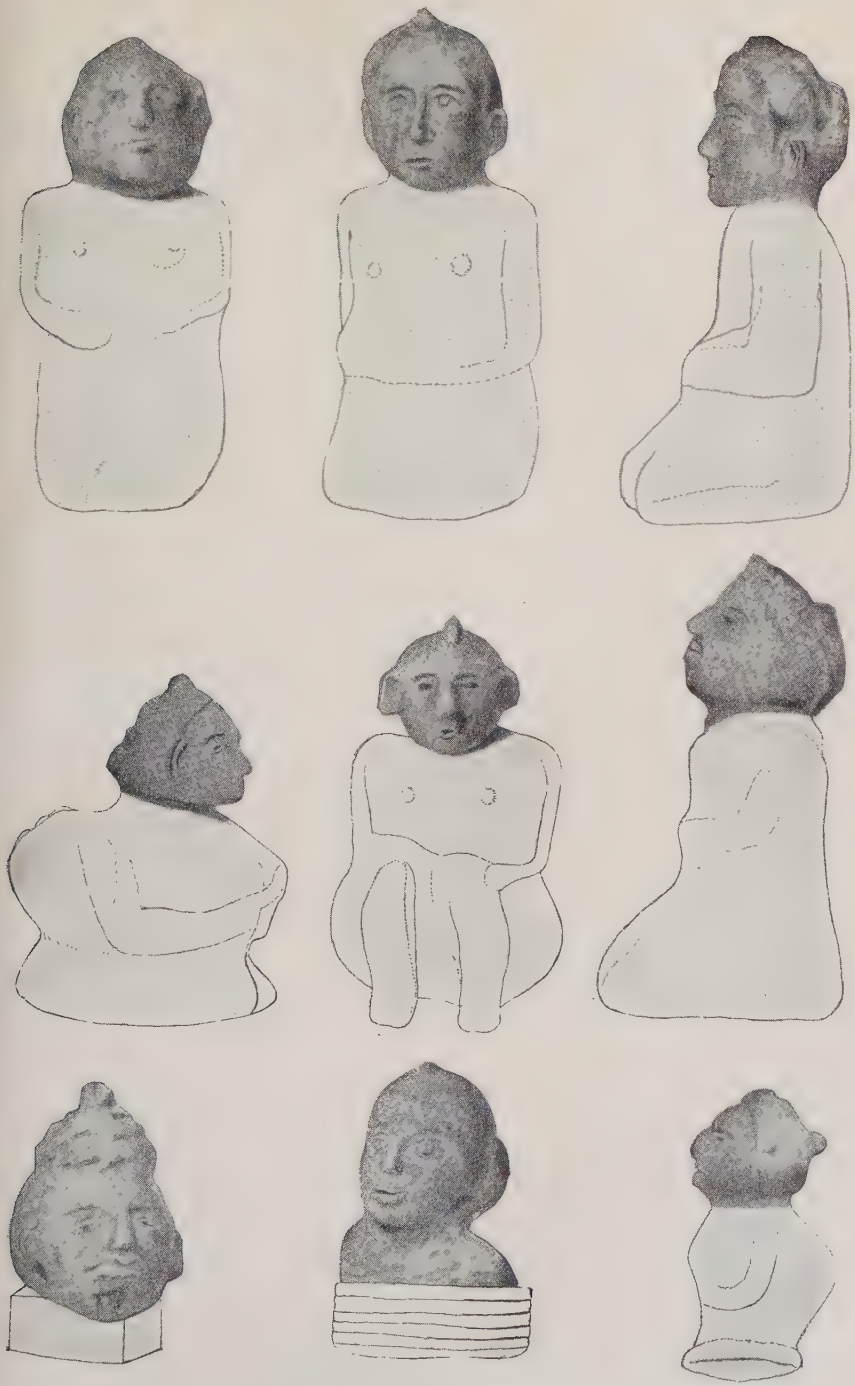
Ca . No. 173688, U.S.N.M. ½ natural size.

blance; the head is thrown back, chin in air, retreating forehead, the high cheek bones, the eyes and mouth made in the same way as the other pottery effigies, and generally the similarities are such as to identify them with the same style of art.

The author has avoided, so far as possible, any reproduction from Professor Holmes's work on Art in Pottery, and it is not intended to go into this subject. The foregoing have been introduced in order to call attention to the peculiarities of the human face throughout this geographic area, whether in stone or on pottery. Many other examples might be cited and copied if required.

DIFFERENT AREAS AND STYLES.

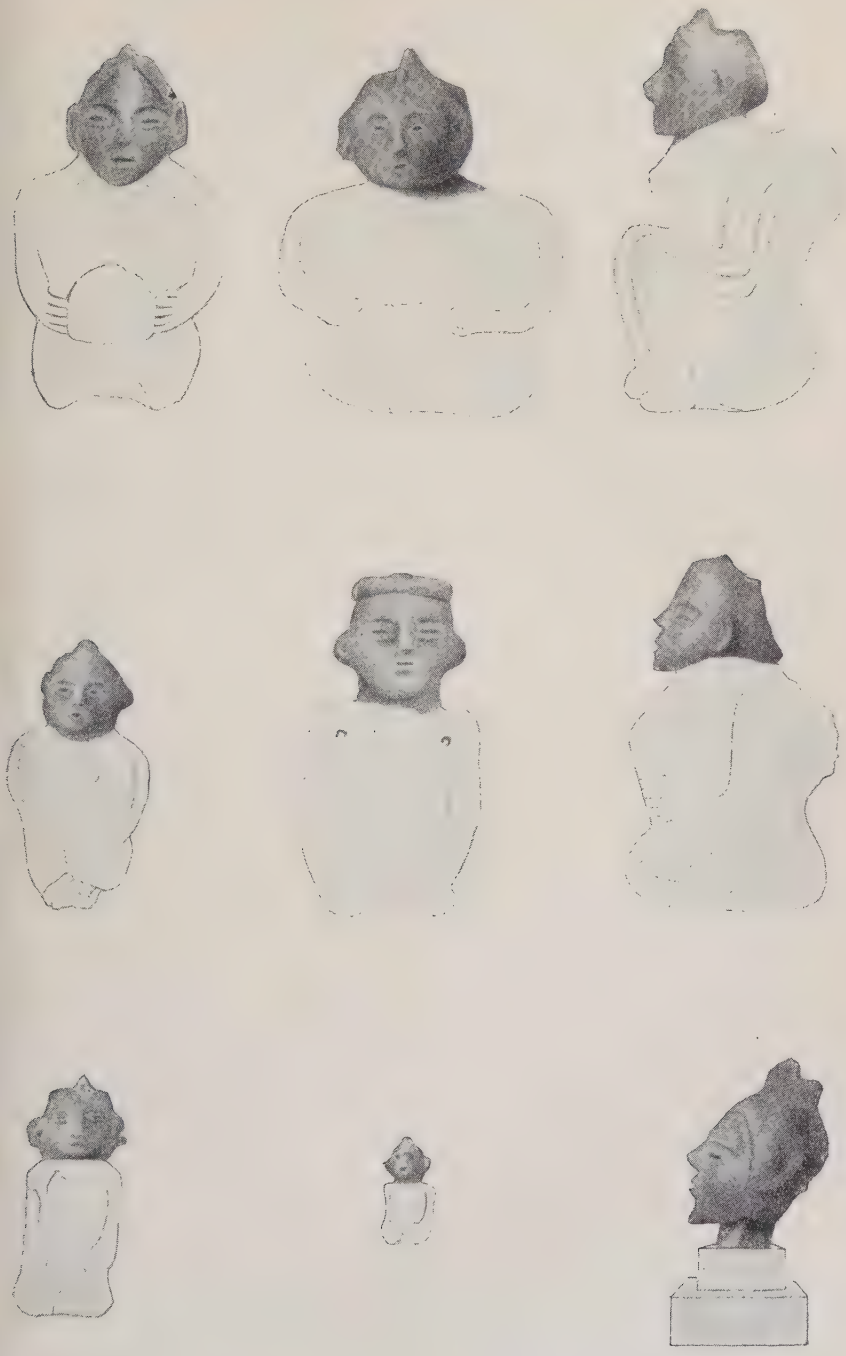
We now pass to a different style of sculpture, still aboriginal, but belonging to a different geographic area, the center of which might be indicated generally as Illinois. Fig. 132 represents a statue taken from



A SERIES OF EIGHTEEN EFFIGY BOTTLES FROM STONE GRAVES, TENNESSEE, REPRESENTING THE HUMAN FACE.

General Thruston's collection, Nashville, Tennessee.

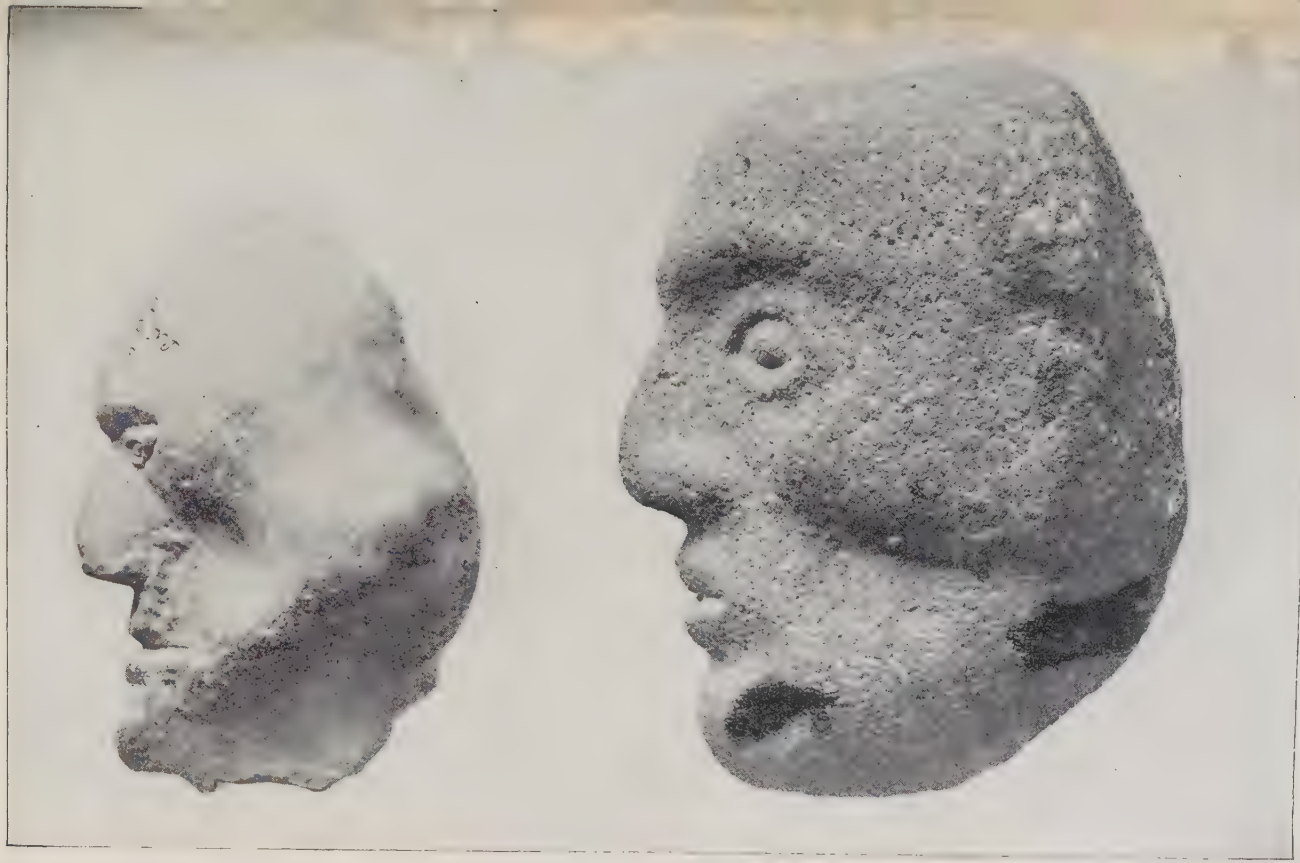
$\frac{1}{3}$ natural size.



SERIES OF EIGHTEEN EFFIGY BOTTLES FROM STONE GRAVES IN TENNESSEE, REPRESENTING THE HUMAN FACE.

General Thruston's collection, Nashville, Tennessee.

$\frac{1}{3}$ natural size.



TWO RUDE SCULPTURED HEADS IN STONE.

(*a*) From Monmouth, New Jersey (American Naturalist, p. 70, 1889); Cat. No. 61474, U.S.N.M. (*b*) From Southfield, Staten Island; Cat. No. 98133, U.S.N.M.

a mound in Union County, Illinois, by Mr. T. M. Perrine. The figure, like many shown, occupied a sitting posture, the base being flat so that the statue will sit alone. It differs from many of the foregoing in several respects. The right knee is drawn up to the chin so that the foot is placed flat upon the ground; the forehead is receding or retreating, but the head is not thrown back and the chin is not in the air. While the face is round, yet it is not round as are the others. The high cheek bones and great breadth across the middle of the face so noticeable in the former are absent in this. The roll of hair around the top of the head is differently managed. But the greatest differences are in the features. The forehead is not flat either way, but, on the contrary, is quite well rounded; the eyebrows are not cut out, producing a ridge across the face, as in the former specimens; the bridge of the nose is on the same plane as the forehead; the eyes, nose, and lips differ in style and mode of making and, in fact, they represent an individual in such a different light as that one might easily suppose it belonged to a different race from the former. The eyelids are well developed, the eyeball is well rounded, and the pupil is prominent. The nose and mouth are heavy and thick, and, without having any relation to the negro race, they are far from representing the aquiline nose and thin lips in the former figures. Plate 47 represents a specimen of the same type. The position of the body is the same, and the peculiarities of eyes, nose, and mouth are repeated.

Fig. 132.
CLAY STATUE.
Height, 12 inches.
Mound, Union County, Illinois.
T. M. Perrine. Cast, Cat. No. 30249, U.S.N.M.

We pass to a still different geographic area. Plate 52 represents two rude figures of human heads, the smaller one from Monmouth, New Jersey, reported in 1882.[1] The larger one was found in Southfield, Staten Island, near the Fingerboard Road. A glance is sufficient to show the similarity in appearance of the two individuals here represented, and their dissimilarity with the two geographic groups heretofore described. The shape of the forehead, nose, lips, chin, indeed of every feature in both statues, is noticeably different from the others. The expression of the mouths and chins of these two are slightly different from each other, but this might have arisen from want of skill of the artist. There is nothing of the flat- or dish-faced appearance, so prominent in the southern group, nor is there anything of the round or moon-

[1] American Naturalist, 1882, p. 799.

faced appearance in the second group. The forehead is reasonably high, and while retreating or receding, it is not on the plane of the face, as in the southern and other groups.

Fig. 133 is a cast of a pipe from Ohio. Whether it represents the same style as the immediate foregoing or not, it is introduced by reason of its similarity and possible relation. The mouth is similar to those in former representations. It is shown as widely open and deeply excavated. The eyes are represented by excavations only, but the forehead and face are the same general type as those in Plate 52, from New Jersey and Staten Island. The nose and lips are mutilated beyond recognition, except that the root of the former is shown broad and not

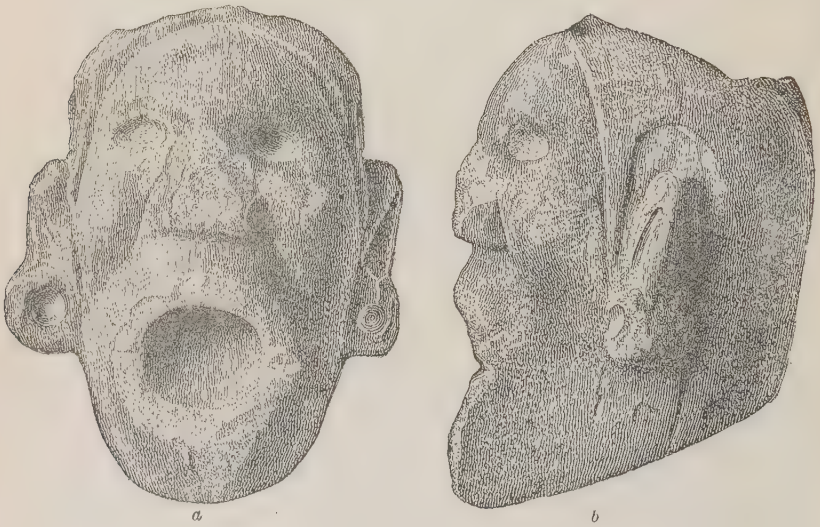


Fig. 133.

PIPE, REPRESENTING SCULPTURED HUMAN HEAD.

Ohio.

Cast, Cat. No. 31750, U.S.N.M. ½ natural size.

thin or pinched. The eyes are different from either of the former groups, and the cheek bones, while high and prominent, have a different contour. This is largely produced by the sunken cheeks, which are not shown in either of the former groups.

No argument is sought to be made that there were different races of aborigines, because of the similarities of the sculptures of the same group or the dissimilarities between the different groups. The author has no intention to do more than note and present the various styles of sculpture, leaving the ethnologic results and conclusions to be worked out at a future time.

Bronze head (Louvre).—A curious and unique piece of bronze sculpture (Plate 53) having a possible relation to the North American Indian, belongs to the Gallery of the Louvre, Paris. But little is known of its history. It formed part of the collection of Edmund Durand, which

ROMAN (?) SITULA IN BRONZE REPRESENTING HUMAN HEAD, BELIEVED TO BE OF A NORTH AMERICAN INDIAN.

Louvre Museum.

A. de Ceuleneer, Antiquités du Louvre, 1830.

the King, Charles X, purchased for the Louvre in 1825. Its peculiarities were first noticed by M. Adrien de Longperier.[1] The same article was reproduced in his work.[2] This bronze is classed as No. 826, in the catalogue of the Museum.[3] It is thus described:

> Bust of a slave whose head and face are entirely shaved. The ears are large and hanging. The top of the skull opens by means of a hinge, which is attached to a cover. Above the ears are placed on either side rings in which are adjusted a swinging handle, which represents a branch or twig with buds.

It is first to be remarked that the object is what was called a Roman situla, being a bucket, jug, or kettle, which might be used as shown, for carrying liquids. This style of object is essentially Roman, and from it and the general appearance of the object, its patine, etc., it was the opinion of M. de Cueleneer, professor of the university at Ghent, by whom my attention was first called to it, that the object belonged, or could be assigned to, the century before the Christian era.

The author once lived in Ghent, where he was acquainted with M. de Cueleneer, who has been twice in Washington, and during his visit to the National Museum became much interested in the Catlin Gallery of Indian Portraits, of which the United States National Museum published a catalogue filling the entire report of the year 1885. The author procured a copy of this report for M. de Cueleneer, who has used it with good effect in his notice of the bronze situla now under consideration.

It was his opinion, although this bronze piece was made probably in Italy during the first century prior to the Christian era, that it represented, or may have represented, a red Indian from America. In support of this contention he presented about a dozen figures of Indian heads, taken principally from the National Museum Catalogue of the Catlin Gallery; and he called special attention to the similarity of the anatomical and somatologic characteristics and peculiarities represented in both. He says of the bronze head that the skull is dolichocephalic, the forehead is retreating, the ears are large and low and the lobes adherent, the eyebrows are strongly arched, the nose is aquiline, the angles of the mouth are turned up and the lips large, the under jaw is rounded, the occiput is protuberant. The discovery of this bronze afforded M. de Longperier in a partial, and M. de Cueleneer in a complete manner, the opportunity to correlate and explain certain fragments of notes by Cornelius Nepos which seemed to have always troubled and disconcerted commentators. He speaks of the "Indian slaves" as having been cast away by the sea on the coast of Germany. These fragmentary notes of Cornelius Nepos have been preserved by Pomponius Mela and by Pliny, the naturalist.

[1] Bull. de la Soc. imp. des Antiq. de France, 1859, pp. 83-85 (t. XXVI des Memoires).
[2] Volume II, pp. 452, 453.
[3] Notice des bronzes antiques exposes dans les galeries de Musée Imperial du Louvre, 1re partie, 1868, p. 143.

Pomponius Mela says:[1]

Testum autem rei, Quintum Metellum Celerem adicit, eumque ita rettulisse commemorat: cum Galliæ proconsule præcessit, Indos quosdam a rege Botorum dono sibi datos; unde in eas terras devenissent requirendo cognosse, vi tempestatum ex Indicis æquoribus abreptos, emensosque quæ intererant, tandem in Germaniæ litora exisse.

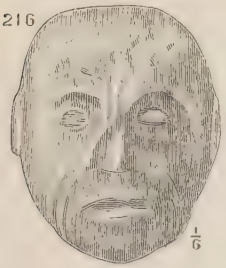


Fig. 134.
SCULPTURED HUMAN HEAD, LIMESTOME.
Collected by President Thomas Jefferson. Cat. No. 16816, U.S.N.M.
1/6 natural size.

Pliny records the same fact as follows:[2]

Idem Nepos de septentrionali circuitu tradit Quinto Metello Celeri L. Afrani in consulatu collegæ, sed tum Galliæ proconsuli, Indos a rege Suevorum dono datos, qui ex India commerci causa navigantes tempestatibus essent in Germaniam abrepti.

The reports of these two writers agree in all essential parts, except the word Botorum in Pomponius Mela, and Suevorum in Pliny. Subject to this variation, the story of both, as reported by Cornelius Nepos, is that a king (of the Botes or of the Sueves) made a present to Quintius Metellus Celeri of an Indian or Indians, who, having been cast away at sea, were stranded on the coast of Germany. M. de Cueleneer, in his paper, "Type d'Indien du Nouveau Monde Representé sur un Bronze Antique du Louvre" (1890), goes profoundly into this branch of the subject, shows who Metellus was, where, and at what epoch he was in command, and how he might have received from one of the barbarian kings or tribes a present of slaves, which might have been Indian castaways from the coast of North America. He then recites the discovery of the bronze situla in the Louvre, and by an examination of its workmanship and appearance concludes it was made in Italy during the first century before the Christian era, and from its great resemblance to the red race of America, as represented in the Catlin Gallery, he concludes the chances are favorable for it having been a sculptural representation of a North American Indian.

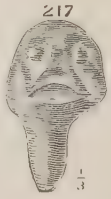


Fig. 135.
DARK FERRUGINOUS STONE, A NATURAL FORMATION MODIFIED BY CARVING OF EYES, NOSE, AND MOUTH.
Ohio.
Cat. No. 12292, U.S.N.M.
1/3 natural size.

Fig. 134 represents the sculpture of a human head almost life-size cut from limestone. It is of interest irrespective of any intrinsic value, on account of having been in the possession of President Thomas Jefferson while he lived at Monticello. Although much mutilated, it is still sufficiently preserved to show creditable aboriginal workmanship. There is no exaggeration or deformity in any part of this head, which might be a likeness of an aged person with a deeply wrinkled face. A conical cavity in its base served to keep it in position. There is another cavity in the back of the head. The records of the Smithsonian Institution contain no information as to the locality whence it came.

[1] De Chorographia, III, 5, 45 (ed. G. Parthey, Berlin, 1867).
[2] Historicæ naturalis libre, II, 67.

"THE PRAYER TO THE GODS OF THE CHASE. TWO CROUCHING LIONS. SCULPTURED FROM SOLID ROCK.
Pueblo region, New Mexico.
Reproduced from painting of E. W. Deming, artist by permission from Klackner, photographer, New York City.

Fig. 135, from Ohio, is a natural formation of dark ferruginous stone, which has been modified by the carving of eyes, nose, and a wide-open mouth.

Fig. 136 is a cast in the United States National Museum of a sculptured stone representing a human face and head in profile, discovered in 1863–64 near St. George, Charlotte County, New Brunswick, Canada. The stone on which this sculpture was made is 21½ inches high by 18¼ inches wide and 2 inches thick. It is granulite, distinguished from granite proper by the absence of mica.

Fig. 136.

PROFILE OF HUMAN FACE, SCULPTURED IN STONE.

St. George, Charlotte County, New Brunswick, Canada.

Cast, Cat. No. 35601, U.S.N.M.

Plate 54 represents the sculptured statues of two stone lions, crouching, carved by aboriginal artists. They are cut out of the solid outcropping rock, supposed to have been done with obsidian knives, but this has not been verified. There are two pairs of these lions, both on the high mesa (in the country of the Cochitanos, west of the Rio Grande), one near the prehistoric ruined pueblo of Potrero de las Vacas, the other pair near the same kind of pueblo Potrero de la Idelo. The latter pair have been wrecked by some enterprising prospector, who drilled and exploded one of them with dynamite.

The painting[1] from which the Las Vacas plate was taken was made by Mr. E. W. Deming, artist, and was first seen by the author at Veerhoff's, F street, Washington City. An application to the artist secured the foregoing description, with the explanation that these sculptures are still regarded with superstition and as having supernatural power, insomuch that the older Cochitano Indians believe them to be the gods

[1] It has been photographed and copyrighted by Klackner, of New York, to whom the author is indebted for the copy and the right of reproduction.

of the chase, and make invocations and prayers to them preparatory to going on a hunt. Mr. Deming has represented such a scene.

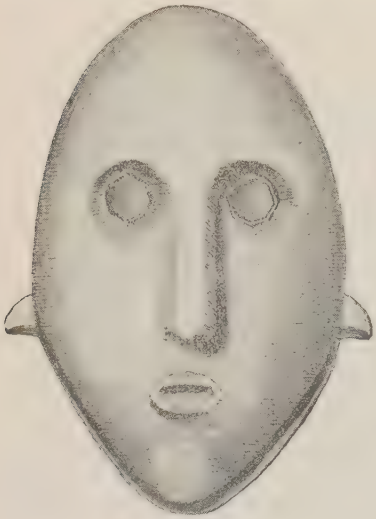


Fig. 137.

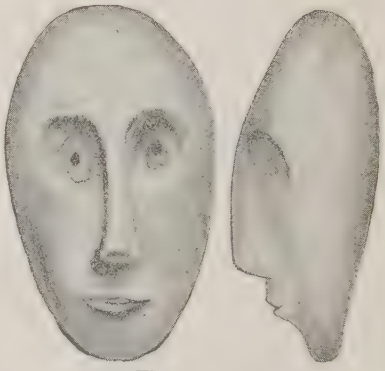
SANDSTONE MASK, RUDELY REPRESENTING A HUMAN FACE.

Lawrenceburg, Indiana.

Cast, Cat. No. 10018, U.S.N.M.

Masks.—Not infrequently aboriginal sculptures have been found, some among the savages of the United States, but in greater numbers in Mexico, which have been called masks, being made of flat and comparatively thin stone with human features sculptured thereon. Similar masks are reproduced on the Pacific coast, far north, in wood with various painted decorations, and also form part of the discovery of Mr. Cushing on the southwest coast of Florida.

Fig. 137 represents a mask roughly carved from sandstone. It is 12 inches high, 7½ inches broad at the ears, and weighs nearly 9 pounds. As usual, it is slightly concave at the back. It was found while plowing near Lawrenceburg, Indiana. Figs. 138 and 139 are face and profile views of a mask of sandstone found in Belmont County, Ohio, nearly opposite Wheeling. Neither of these have any marks or holes in the back for suspension or attachment. The similarity of the art work of these with that of fig. 140 will be apparent at a glance, and it may be queried whether the similarity of appearance may not have some application to race, but upon the latter proposition no opinion is expressed.



Figs. 138, 139.

STONE MASK, HUMAN FACE, FRONT AND SIDE VIEWS.

Belmont County, Ohio.

Cast, Cat. No. 39014, U.S.N.M. ½ natural

Fig. 140 is a small stone mask from Gambier, Ohio. It displays better art in the working of the material than in its representation of the human face. The stone is quite hard, it can only be wrought by pecking or battering and then rubbing or grinding to make it smooth. The horns projecting from the head are for an unknown purpose; the ears are too low on the side of the head; the nose and mouth are impossible in the human subject, but with all these peculiarities the stone has been well wrought and nicely polished.

Fig. 141 is a mask of grotesque appearance; it is of pot-stone from

Morgantown, Catawba County, North Carolina. The slab is about 2 inches in thickness, and the back is slightly concave. The mechanical art of the stone working is better than the artistic representation of the human face. The face is quite too long for its width. The features are extremely rude, the eyes being represented by mere excavations in the stone. The nose is a simple protuberance. The hair is not represented, and there is but a faint representation of eyebrows, which is made by a shallow groove running across the face from one temple

Fig. 140.

STONE MASK.

Gambier, Ohio.

Cat. No. 31384, U.S.N.M. Natural size.

to the other. The chin is represented by a square figure, and the neck might serve for a handle. There are many of these masks of different materials and style. Their purpose is unknown. A suggestion is given of the possibility of use of this specimen by the holes which have been drilled along the side, and which may have served for attachment. Some of the masks from Mexico and Central America have similar holes.

Fig. 142[1] represents two views of a bust carved from coarse marble, which was found in one of the small mounds on Colonel Tumlin's place

[1] Twelfth Annual Report of the Bureau of Ethnology, 1890–91, pp. 30, 308, fig. 191.

on the Etowah River, near Cartersville, Georgia. Originally carved as a head or bust, the seams in the marble have opened and the face part has split off, forming a quasi mask. The representation is of the human face, which appears quite natural in its proportion and features; with, however, slight resemblance to the physiognomy of the North American Indian. This has no signification and is not worthy of consideration, for this group of mounds has furnished the copper and shell objects noted by Prof. W. H. Holmes in the Second Annual Report of the Bureau of Ethnology, quoted in my paper on "The Swastika," and described at length in the report of Professor Thomas.[1] Professor Thomas says that in all their leading features these designs are suggestive of Mexican or Central American work.

Fig. 141.

MASK, OF GROTESQUE APPEARANCE. POTSTONE.

Morgantown, Catawba County, North Carolina.

Cat. No. 35001, U.S.N.M. ⅓ natural size

Some of the Mexican sculptures were described in the paragraphs on jade. Masks and sculpture in stone from Mexico are here continued.

Fig. 143 represents a typical Mexican mask of greenish mottled feldspathic stone, and is 5½ inches long. Its back is slightly concave and the mouth and eyes have been excavated by drilling, as can be seen in the corners. It is finely polished throughout its entire surface. The holes in the edges by which it could be fastened are shown. Dr. Rau gave as his opinion that these masks were used for covering the faces of idols on certain occasions.

Figs. 144 and 145 are specimens from Mexico representing the human form.

Pipes.—The pipes used by the aborigines of North America were not infrequently ornamented with sculptured representations of men and women, but a greater number were ornamented with animal forms. The books written upon the archæology of the North American aborigines abound in representations of these sculptures. Squier and Davis, Dr. Rau, Abbott's "Primitive Industry," Jones's "Antiquities of the Southern Indians," Thruston's "Antiquities of Tennessee," and similar works contain these representations in greater or less numbers. A few specimens of animal forms were not utilized as pipes, but it is entirely uncertain whether they were not unfinished specimens intended for pipes.

Engraved Tablets.—Certain engraved or incised stones or tablets have been found in the United States, under circumstances which

[1] Twelfth Annual Report of the Bureau of Ethnology, pp. 303–311, with plates XVII, XVIII, and figs. 186–192. See also fig. 150, p. 501.

identify them beyond all doubt as aboriginal. Their use is unknown, although it has been suggested that they served as stamps for impressing colored ornamental figures upon cloths or prepared skin. A peculiar class of these tablets of intaglio sculpturing are those represented in figs. 146 and 147. Fig. 146 represents the celebrated "Cincinnati tablet," now in the Art Museum, Cincinnati, Ohio, where it has been deposited by its owner, Mr. Gest. The authenticity of this tablet has been disputed.[1] It was found in December, 1841. The material is a compact, fine-grained sandstone of a light-brown color. It

a *b*

Fig. 142.

STONE MASK.

Etowah mound, Georgia. Coarse marble.

Thomas, Twelfth Ann. Rept. Bur. Ethnol., 1890–91, p. 308, fig. 191. Cat. No. 91110, U.S.N.M. ⅓ natural size.

is 5 inches in length, 3 inches in breadth, and about ½ inch in thickness. The figures are cut in low relief, the lines being not more than $\frac{1}{20}$ inch deep. This tablet had stood, from the time of its discovery until the meeting of the American Association for the Advancement of Science at Springfield, August, 1895, without any serious attempt at explanation or translation, when this work was attempted by Professor Putnam and Mr. C. C. Willoughby under the title "Symbolism in Ancient American Art."

[1]The question is argued at length in the Transactions of the American Ethnological Society, II, and in Squier and Davis's "Ancient Monuments of the Mississippi Valley," p. 274, figs. 194 and 195.

Fig. 15 [146] is the "Cincinnati tablet," showing the serpent combined with the human form. A careful study of this complicated design shows it to be formed on the same principle as those carved on bones. Not only is the duplication of the right and left sides apparent, but there is also a remarkable duplication of the different parts when they are reversed, the right and left and the upper and lower. This is shown in the reduced outlines given in fig. 16, of which *a* shows the human figure as in fig. 15. We notice here the ears, *cc*, as straight bars on each side of the head; the eyes, the two dark circles, each with two projecting curved arms; the nose, the lozenge-shaped space, and the broad mouth, the transverse white space below. The body includes the two oval figures in the center, which are duplicates of each other, as will be seen by folding the upper over the lower. The arms curve outward and the hands are shown at *dd*, with the fingers pointing inward; the three middle fingers are represented by the trefoil between the long curved thumb above and the little finger below. The legs project from the lower portion of the body and are bent upward at the knees, *ff*; the feet with the toes pointing outward, *ee*, are duplicates of the hands. Here the duplication is with the left foot and the right hand turned upward on each other and reversed; the same with the right foot and left hand; while the duplication is again shown by folding the hands and feet of one side upon the opposite side.

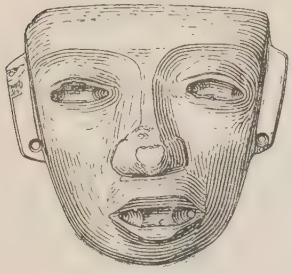


Fig. 143.

MASK, FELSPATHIC STONE.

Mexico.

Cat. No. 98989, U.S.N.M. ½ natural size.

Fig. 144.

HUMAN IMAGE, OF GREEN MOTTLED STONE.

Mexico.

Collected by Dr. Berlandier and presented through Gen. D. N. Couch. Cat. No. 5484, U.S.N.M. ½ natural size.

Fig. 145.

HUMAN IMAGE, IN HARD OR SEMI-PRECIOUS STONE.

Northeast Mexico.

Collected by Dr. Berlandier. Cat. No. 5486, U.S.N.M. Natural size.

In the reverse[1] of this human design (shown in fig. 16b) the two serpent heads are shown at the bottom of the figure, with the slender necks extending off on each side and connecting with the central portion of the design; *j* indicates the jaw of each serpent head. The symbolic eye with its double arms is seen above the jaw, and the four horns or plumes of the serpent, two above and two below, curving backward, are of the same character as shown on many other serpent heads from Mexico and Central America. The double reversal of the several portions of the whole design can readily be seen by following the lines on the opposite sides of these reversed outlines, *a* and *b*.

Fig. 147 is a representation of a cast of a tablet of compact Waverly sandstone taken from a mound near Waverly, Pike County, Ohio, during the month of March, 1872, by Dr. Hurst, of Piketown. It was obtained by Mr. J. P. Maclean, who sold it to Mr. Robert Clarke, of Cincinnati, who has deposited it

[1] Meaning upside down.

in the art museum of that city. The sculptured figures on this tablet are in low relief, resembling somewhat those on the "Cincinnati tablet." (Fig. 146.) This similarity is recognizable at a glance. The work is so much alike that they might have been done by the same artist, but the figures in outline and character are so different as to seriously affect the theory of the symbolism and duplicate representation of man and serpent. There is in this, apparently, neither head, mouth, body, nor extremities, which have been so elaborately and ingeniously discovered and described in connection with the former tablet.

FIG. 146.

"CINCINNATI TABLET."

Original in Cincinnati Art Museum, property of Mr. Gest.

Cast, Cat. No. 72050, U.S.N.M. Natural size.

Footprints.—A peculiar and as yet unexplained series of stone sculpturings have been found in the territories now forming the United States, and which are believed to be unique among its aborigines. These are sculptured footprints, and they have given rise to much speculation and discussion. The footprints at Carson, Nevada, were a source of great wonderment, nor has their origin been settled in a manner acceptable to all. Specimens of footprints have been found in the lava or volcanic mud in Nicaragua (Cat. No. 98757, U.S.N.M.) and possibly other Central American States, yet they were the actual footprints, and had no relation to the art of sculpture. But in divers portions of the United States actual sculptured specimens have been found. Fig. 148 represents a pair of human footprints sculptured on

a sandstone slab, or rock, on the Upper Missouri River. This slab, as shown in the figure, was cut out from its original resting place. The work was done by Captain Little, United States Army, and presented to the United States National Museum by him. The tracks are about 11 inches long and represent the feet as covered with moccasins.

Fig. 147.

"WAVERLY TABLET," SANDSTONE.

Waverly, Ohio.

Cincinnati Art Museum, property of Mr. Robert Clarke.

Cast, Cat. No. 98060, U.S.N.M. Natural size.

Fig. 149 is another specimen representing the print of a naked human foot with several cup markings on the same surface. It was cut in a flattish quartzite bowlder, and was found in Gasconade County, Missouri, by Mr. John P. Jones, by whom it was sent to the National Museum. The length of the track is $9\frac{3}{8}$ inches. The opposite side of the bowlder bears a footprint less distinct than this.

Sculptures similar in appearance to the latter, but representing the human hand instead of the foot, have been found among the aborigines. One (Cat. No. 43126, U.S.N.M.), on a flat and smooth limestone or marble slab, was found in a mound near Naples, Illinois, and presented to the United States National Museum by Mr. J. B. Henderson. It represents the hand more by outline than intaglio. It is about twice the natural size, and shows the fingers spread widely apart.

Pottery.

After stone, pottery came into the greatest use in prehistoric times. It has peculiar interest to us in that it was the material which lent itself most readily to art purposes, and again from its great resistance to the ravages of time. The manifestation of art on pottery in the way of decoration could be perpetuated, not only from its enduring character, but when broken into fragments the decoration would not be lost. The greatest number of patterns and art motifs of prehistoric times throughout the Eastern Hemisphere have been perpetuated in the fragments of pottery.

EUROPEAN.

Neolithic.—It has been contended that pottery was not employed in western Europe during the Paleolithic period. The consensus of opinion is in favor of the existence of pottery during this period in some portions of Europe, while it did not exist in other portions. Some of the caverns of Belgium, which have otherwise yielded no objects but such as are identified with the Paleolithic period, still have yielded fragments of pottery. There is in the museum at Brussels, Belgium, a vase almost entire, reconstructed from the fragments found in one of these caves. But there is continually the question of intrusion and subsequent occupation. It is the definite opinion of M. de Mortillet that no evidence has been discovered of the use of pottery in France or England during the Paleolithic period. During the Neolithic period and the Bronze age, pottery abounded throughout western Europe, and it is now found in quantities in nearly all localities occupied by prehistoric man in these ages.

Fig. 148.
SCULPTURED HUMAN FOOTPRINTS IN SANDSTONE ROCK.
Upper Missouri River.
Collected by Captain Little, U. S. A. Cat. No. 7637, U.S.N.M. $\frac{1}{8}$ natural size.

There is considerable variation between the potteries of different localities; difference in material, some being coarser, others finer, and in shape or form, and in decoration.

The northwest coast of France, including the ancient province of Brittany, seems to have produced the finest pottery after that of Denmark; while that of the central and southern parts of France and of England seems to have been coarser and ruder. It is no purpose of this paper to describe the making of pottery, but one may say that in all this prehistoric period the pottery vases were made without the use of the wheel or furnace. All evidence points to the introduction of the latter into western Europe from Greece through Etruria and Rome. It was not until the Roman conquest of France and England that these countries were affected by the knowledge of the wheel and furnace, and this can be carried a step farther, for within the memory of living men this knowledge had not been spread throughout the British islands. In northern Scotland and among the Orkneys and Hebrides islands the rude household pottery

is made in the same manner as in prehistoric times, and apparently this knowledge had descended from generation to generation unaffected by outside influences. The theory has been put forth that prehistoric pottery was hardened by exposure to the sun. While exposure to the sun might harden it sufficiently to maintain its form and to hold substances of little weight and no moisture, yet for the ordinary uses of pottery the hardening by the sun is insufficient, and it is believed that all pieces and fragments of prehistoric times were burnt.

These prehistoric vases were for the most part rounded at the bottom and unable to sit alone. The suggestion is made, by way of explanation, that they were suspended over the fire, and anything in the way of a bottom as a base or legs would interfere with this, and therefore the bottoms were rounded.

Fig. 149.

SCULPTURE OF NAKED HUMAN FOOTPRINT ON A QUARTZITE BOWLDER.

Gasconade County, Missouri.

Collected by John P. Jones. Cat. No. 15793, U.S.N.M.

$\frac{1}{3}$ natural size.

The form most affected throughout western Europe for pottery vases was that called the tulip. It was the commonest in Brittany, where the material was the finest; but it was also used in England, in Hanover, Bohemia, Hungary, Sicily, and in Portugal. Plate 55 represents two vases of the tulip form, with characteristic ornamentation, from southeastern France. They were found in a dolmen in the neighborhood of the little hamlet of St. Vallier, in the department of Alpes-Maritimes, where the author spent a summer in archæological researches. They were found by and are the property of M. Casimir Bottin.

Plate 56 will show the form of pottery vases in various European countries during the Neolithic period. The style of decoration has been shown in plates 19 and 20, and need not be further treated here.

Bronze age.—The pottery of the Bronze age was not materially different from that of the Neolithic period. There is, to be sure, a certain change of form; all specimens seem to have been smaller. There are a great number of cups, dishes, plates, etc. The paste is finer, the walls are thinner, and the decoration, while of the same general style, is a continuation of the lines, dots, and curves arranged in geometric form. They are, however, made lighter and closer together, giving the ornamentation a finer and more artistic air. With these exceptions, the pottery of the Bronze age was much the same as that of the Neolithic period.

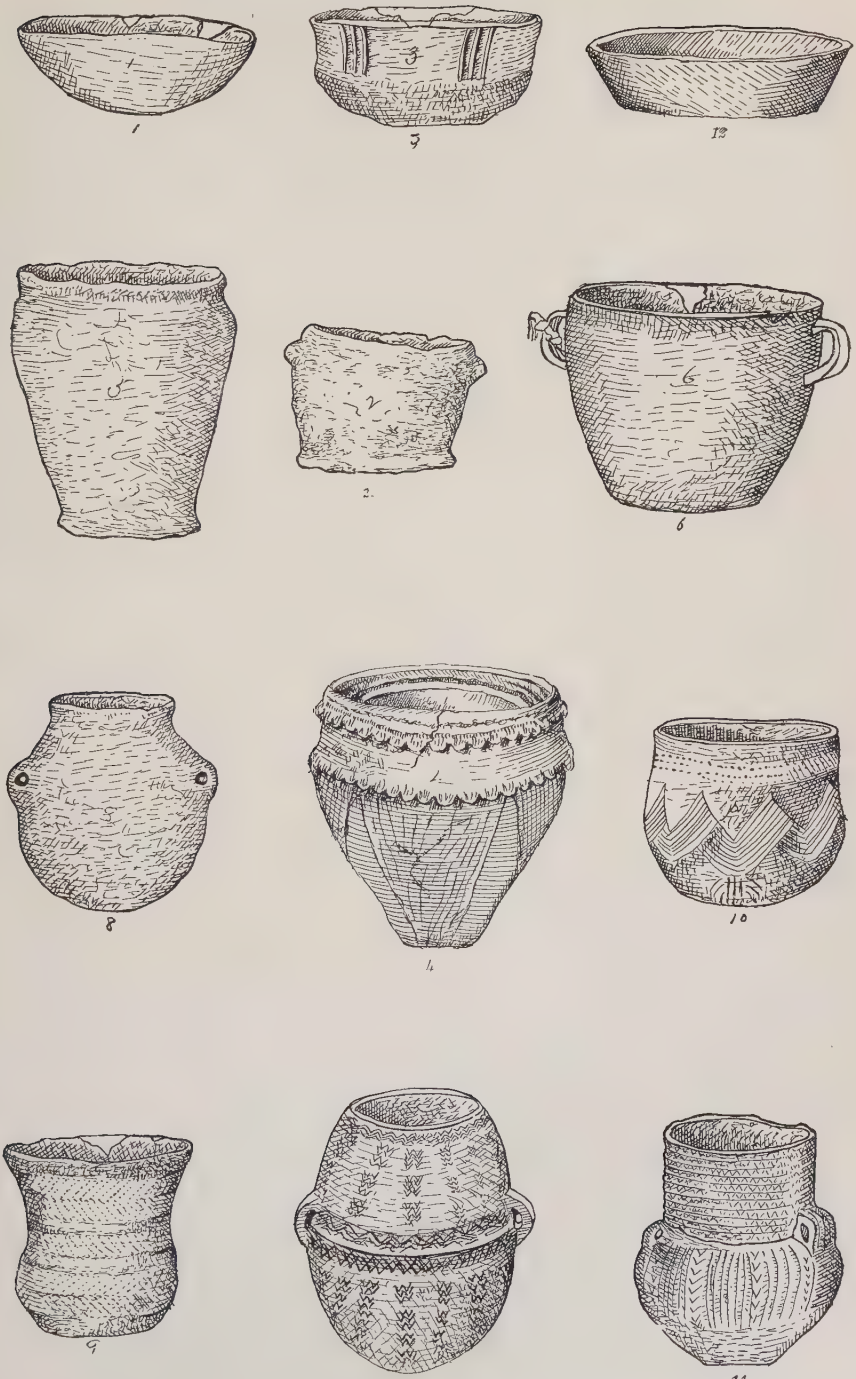
POTTERY VASES OF TULIP FORM, THE STANDARD OF DOLMEN POTTERY.

St. Vallier (Alpes-Maritimes), France.

Collected by M. C. Bottin. ⅛ natural size.

EXPLANATION OF PLATE 56.

Fig. 1. From Morbihan, France.
Fig. 2. From Vienne, France.
Fig. 3. From Morbihan, France.
Fig. 4. From Northumberland, England.
Fig. 5. From Seine-et-Marne, France.
Fig. 6. From Terramare of Mercurago, Italy.
Fig. 7. From Denmark.
Fig. 8. From Paris.
Fig. 9. From Morbihan, France.
Fig. 10. From Mönsheim, near Worms, Germany.
Fig. 11. From Denmark.
Fig. 12. From Robenhausen, Switzerland.



ART FORMS OF VARIOUS POTTERY VASES IN EUROPEAN COUNTRIES.

$\frac{1}{6}$ natural size.

Canon Greenwell, in his work on British Barrows,[1] speaking of the prehistoric pottery found therein, says:

> The most common forms of ornament are alternate series of parallel horizontal and vertical lines (like heraldic compone, if it were engraved as of gules and azure); now and then in a double series (as counter compone); triangles set in rows (or, rather, what heralds call a dancette line of partition), the triangular space formed being filled with parallel diagonal lines, which have a different direction in each alternate space (like alternate representations of heraldic purpure and vert); rows of round or oval impressions encircling the urn; lines forming a reticulated pattern; lines placed herring bone fashion, or in a zigzag. The lines are often made by impressions of twisted thong or cord, but sometimes are drawn on the clay with a sharp-pointed instrument. In some rare cases raised ribs occur in the rim [fig. 59], and one from Rosebrough, Northumberland, has a series of figures in relief [fig. 60].

Many of the designs on plates 19 and 20 are taken from Canon Greenwell's book, and are such as here described.

The first material change in pottery in France and England was possibly brought from Etruria. The next was by the importation of the Samian or Aretine ware brought by the Romans. This pottery was thick, heavy, hard, resisting all ravages of time, and, except for breakage, the specimens now found are as perfect as they were originally. It was of finer paste, still not made with the wheel, but in molds. The ornamentation was in relief, being usually on the outside, the soft paste having been pressed into the mold. Most of these specimens were brought to western Europe by the Romans themselves, though it is supposed they were made there during the long period of Roman occupation.

Grecian, Etruscan, and Roman pottery were all different from anything more modern. The knowledge of their manufacture has been lost, and all these kinds of pottery have become extinct. They are almost prehistoric, but because of the localities wherein they have been found, and the objects with which they were associated, they have come to be placed under the head of Classic, rather than Prehistoric, Archæology. The works on that subject should be consulted by any one desirous of pursuing the study.

UNITED STATES (EXCLUDING THE PUEBLOS).

Neolithic.—Without attempting a discussion of the differences of the culture status of the Neolithic period in the country occupied by the North American savage, and other countries of the Pueblos, Mexico, Central and South America, it is sufficient to say that there certainly were great differences in the pottery manufactured by the respective peoples of these countries. The southern potteries are so different and so superior to those of the peoples to the north that it would require a volume to do them justice. All present attempts will be confined to northern Neolithic peoples.

Professor Holmes's description.—Professor Holmes has gone quite thor-

[1] Page 71.

oughly into the subject of the pottery of this country, and reference is made to the numerous papers he has published.[1] Anyone desiring to examine the subject in detail is respectfully referred thereto. This paper deals only with art, and consequently only with form and designs of decoration.

In his paper on "The ancient pottery of the Mississippi Valley[2]" he epitomizes the propositions, thus:

Form.—This ware exhibits a great variety of form, many of which are extremely pleasing. In this respect it is far superior to the other prehistoric groups of the eastern United States. The shapes are as varied and elegant as those of the ancient Pueblo pottery, but are inferior to those of Mexico, Central America, and Peru. * * *

Finish.—The finish, as compared with the work of civilized nations, is rude. The surface is often simply hand or trowel smoothed. Generally, however, it was more or less carefully polished by rubbing with an implement of stone, shell, bone, or other suitable substance, the markings of these tools being distinctly visible. Nothing resembling a glaze has been found on pieces known to be ancient. The surface was sometimes washed or coated with a slip or film of fine clay, which facilitated the polishing, and in very many cases a coat of thick red ocher was applied.

Ornament.—The ancient potter of the middle province has taken especial delight in the embellishment of his wares, and the devices used are various and interesting. They include, first, fanciful modifications of form; second, relief ornament; third, intaglio figures, and fourth, designs in color.

Modification of shape.—It can hardly be claimed that the ancient peoples of this region had a very refined appreciation of elegance of outline, yet the simple, essential forms of cups and pots were by no means satisfactory to them. There are many modifications of shape that indicate a taste for higher types of beauty and a constant attempt to realize them. The æsthetic sentiment was considerably developed.

There is also a decided tendency toward the grotesque. To such an extreme have the dictates of fancy been followed in this respect, that utility, the true office of the utensil, has often taken a secondary place, although it is never lost sight of entirely. Bowls have been fashioned into the shapes of birds, fishes, and reptiles, and vases and bottles into a multitude of animal and vegetable forms without apparent regard to convenience. All of these modifications of essential forms were doubtless looked upon as in a sense ornamental. So far as I can determine they were in no case intended to be humorous.

Relief ornament.—Decorative ideas of a purely conventional character are often worked out in both low and salient relief. This is generally accomplished by the addition of nodes and fillets of clay to the plain surface of the vessel. Fillets are applied in various ways over the body, forming horizontal, oblique, and vertical

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[1] Ancient Pottery of the Mississippi Valley. (Proc. Davenport Acad. Sci., IV, 1884.)

Origin and development of Form and Ornament in Ceramic Art. (Fourth Annual Report of the Bureau of Ethnology, 1886.)

Ancient Pottery of the Mississippi Valley. (Fourth Annual Report of the Bureau of Ethnology, 1886.)

Pottery of the Ancient Pueblos. (Fourth Annual Report of the Bureau of Ethnology, 1886.)

Earthenware of Florida. (Certain Sand Mounds of the St. Johns River, Pt. I. By Clarence B. Moore. 1894.)

Ceramic Art of the Eastern United States. (Report of the Bureau of Ethnology, not yet published.)

Caribbean Influence on the Prehistoric Ceramic Art of the Southern States (Amer. Anthrop., January, 1894.)

Order of Development of the Primal Shaping Arts. (Proc. A. A. A. S., 1894.)

[2] Fourth Annual Report of the Bureau of Ethnology, p. 373.

bands or ribs. When placed about the base or rim, these fillets are often indented with the finger or an implement in a way to imitate rudely a heavy twisted cord—a feature evidently borrowed from basketry. Nodes are likewise attached in various ways to the neck and body of the vessel. In some cases the entire surface of the larger versel is varied by pinching up small bits of the clay between the nails of the finger and thumb. An implement is sometimes used to produce a similar result.

Intaglio design.—The æsthetic tendencies of these potters are well shown by their essays in engraving. They worked with points upon both plastic and the sun-dried clay, as well as at times upon the fire-baked surface. Figures thus produced exhibit a wide range of artistic achievement. They illustrate all stages of progress, from the most archaic type of ornament—the use of dots and straight lines—to the most elegant combinations of curves, and finally to the delineation of forms and fanciful conceptions.

Generally, when a blunt implement is employed, the line is produced by a movement that I shall call *trailing*, in contradistinction to *incision*, in which a sharp point is used, and *excision* or *excavation*, which is more easily accomplished with the end of a hollow reed or bone. *Impressed* or *stamped* ornament is of rare occurrence, and anything like *repoussée* work is practically unknown. The practice of impressing cords and fabrics was common among many of the northern tribes, and nets have been used in the manufacture and ornamentation of vases at many points within this province. Stamps especially prepared were in use in most of the Gulf States and to a limited extent in northern localities.

Designs in color.—The colors used in painting are white, red, brown, and black, and have generally consisted of thick, opaque, clayey paste, white or colored with ochers. Occasionally the colors used seem to have been mere stains. All were probably laid on with coarse brushes of hair, feathers, or vegetable fiber. The figures are in most cases simple, and are applied in broad, bold lines, indicative of a strong talent for decoration. The forms are to a great extent curvilinear, and embrace meanders, scrolls, circles, and combinations and groupings of curved lines in great variety. Of rectilinear forms, lozenges, guilloches, zigzags, and checkers are best known.

The decided prevalence of curved form is worthy of remark. With all their fertility of invention the inhabitants of this valley seem never to have achieved the rectangular links meander, or anything more nearly approaching it than the current scroll or the rectangular guilloche, while other peoples, such as the Pueblos of the Southwest and the ancient nations of Mexico and Peru, found in it a chief resource.

Mr. C. C. Willoughby, of the Peabody Museum, Cambridge, Massachusetts, has published in the Journal of American Folk-Lore [1] "An Analysis of the Decorations upon Pottery from the Mississippi Valley." It consists of 12 pages, with 21 figures, and represents the different motifs said to have been employed in the decorations upon pottery from the locality indicated. The similarities alleged are not always perceptible and the arguments based thereon are not always logical, but great latitude is permissible in such subjects.

Bronze Age.

It is not the intention of the author to attempt any description of the antiquity, origin, technology, or industry of the prehistoric people during the Bronze age. This would carry us into the realms of archæology, while we have been confining ourselves to art. A few preliminary words may, however, be useful.

[1] January to March, 1897, X, pp. 9–20.

There appears to have been a gap or hiatus between the Paleolithic peoples and the Neolithic peoples in their occupation of western Europe. There certainly were vast differences between their respective cultures, and it has been believed there was a solution of the continuity of occupation in western Europe between these two epochs.[1]

Since the discoveries of Judge Piette[2] in sundry caverns of southern and western France; of MM. Boule and Cartailhac[3] in the Grotto of Reilhac (Lot), and the observations of M. Solomon Reinach[4] on the "*Femme nue*," discovered in the caverns of Mentone by M. Julien, the hiatus between the Paleolithic and Neolithic periods has been controverted, and is not now regarded nearly so certain as formerly.

The contrary appears between the Neolithic and Bronze ages, at least for western Europe, where the introduction of bronze and its subsequent use for weapons and implements seems to have occurred among the same peoples. The advent of bronze for these purposes was by immigration or introduction from some other country, and the peoples (still in western Europe) who used it this year probably were the same as used the stone implements last year. Therefore the introduction of bronze, while it made changes in their implements and so wrought changes in their mechanical ability, yet had comparatively small influence upon their art.

We have already shown the differences between the art of the Paleolithic period and that of the Neolithic period; we have also shown how, in the Neolithic period, the art was confined to the merest decorations of objects, and that it consisted principally of geometric designs. Plates 19 and 20 are again referred to as giving an extended representation of the kinds and styles of ornamentation employed.

The decorative art of the Bronze age was but a continuation of that of the Neolithic period, and it is not impossible that an investigation into the origin of some of the specimens in plates 19 and 20 would show them to have belonged to the Bronze age; that is to say, the styles of ornamentation of the two periods or ages were practically the same, and the latter was but a continuation of the former, with such possible changes or additions as would naturally grow. The marked difference between the two ages was the substitution of bronze for stone in the material for cutting and piercing implements.

The question continually arises whence and how was bronze introduced into western Europe. Of course the answer is lost in antiquity, for there are no records. There is not, and from the nature of the case there can not be, any direct or positive testimony. We can depend only upon the evidence furnished by prehistoric archæology. Many theories have been propounded, none of which have proved

[1] See pp. 374, 401, 415, 423.

[2] L'Anthropologie, 1895, p. 129; 1897, p. 168.

[3] Etudes Ethnographique et Geologique par E. Cartailhac et M. Boule: Lyon, 1889.

[4] L'Anthropologie, 1898, pp. 26–31; and Description Raisonnée Musée de Saint-Germain-en-Laye, p. 267.

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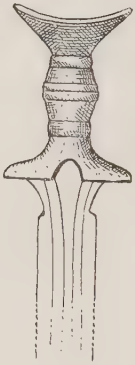

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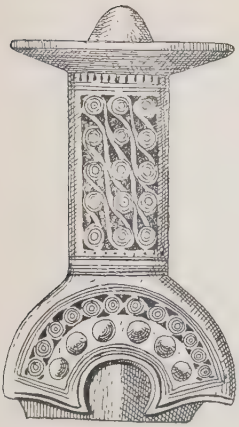

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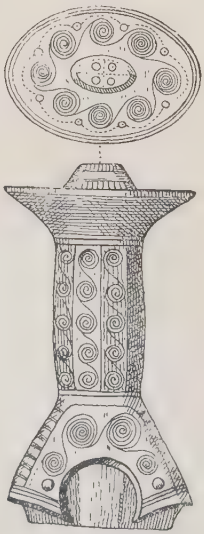

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11

BRONZE SWORD AND DAGGER HANDLES.

Europe.

$\frac{1}{3}$ natural size.

EXPLANATION OF PLATE 57.

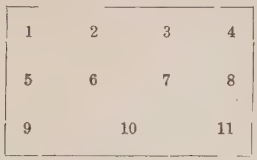


Fig. 1. Found in the Seine River at Rouen. Museum of Rouen.
Fig. 2. From the deposit in the basin of Penhouet, St. Nazaire, France. Kerviller collection.
Fig. 3. Hungary. National Museum, Budapest.
Fig. 4. Canal of Thiele, Berne, Switzerland. Museum of Berne.
Fig. 5. Hungary. Museum of St. Germain.
Fig. 6. From the excavations of Alise-Sainte-Reine (Côte d'Or). Museum of St. Germain.
Fig. 7. Vandrevanges, Germany. Museum of St. Germain.
Fig. 8. Lake of Luyssel, Vaud, Switzerland. Museum of Berne.
Fig. 9. Denmark. Museum of Copenhagen.
Fig. 10. Denmark. Museum of Copenhagen.
Fig. 11. Saint-Genoulph, Indre-et-Loire. Museum of Tours, France.

entirely acceptable. The most general one is that bronze came from the far East, probably from the countries around the Straits of Malacca, and that it belonged to a period relating to the early Aryan dispersions. Bronze is one of the great epoch-making discoveries, greater than that of iron, and as a practical agent of prehistoric civilization, equaled only by the bow and arrow.

The discovery of the fusion of copper and tin, both comparatively soft metals, in the proportions of 90 and 10 per cent, making a new metal, harder than any other then known, capable of being cast, and when cast capable of being made sharp and holding a cutting edge, was a great step in human culture, and calculated to revolutionize the destiny of the human race.

STYLES OF DECORATION.

Plates 57 and 58 represent the art work done on various weapons and implements of bronze. Plate 57 represents sword handles, while plate 58 represents principally knives and scabbards. Articles of dress and for personal adornment, like bracelets, fibulæ torques or ceintures, and similar objects, were made of bronze. These need not be displayed, for they all bear the same general style or type of art decoration. These will show that the decoration consisted principally of geometric designs, and will demonstrate the similarity of the decoration and art work in the Bronze age to that of the Neolithic period.

The Bronze age had no existence in the Western Hemisphere during prehistoric times. All objects of bronze found among the aborigines are believed to have come from Europe.

COPPER IN AMERICA.

Many objects of wrought copper have been found in America. The Lake Superior copper mines in the States of Wisconsin and Michigan appear to have been the center of manufacture, from which the distribution took place, and thence the manufactured implements spread, in gradually decreasing numbers, in every direction throughout the present territory of the eastern United States. The modes of treating copper, whether by smelting, melting, casting, or hammering, and if any or all of these, what amount of heating or melting was done, has never been fully investigated nor have they been satisfactorily determined. Some of the objects were certainly of virgin copper hammered cold, and they were thus made into bracelets, rings, and similar objects of personal adornment, and also into axes, knives, and spearheads. These copper weapons and ornaments continued to be used contemporaneously with cutting implements of stone and of ornaments of shell and bone.

The author is well aware of the contention that there was in Europe a Copper age intermediate between the Neolithic and Bronze ages, and he has visited and examined the national collection in the city of Berne, Switzerland, which contains the greatest proportion of copper

objects, and has furnished the principal basis for the argument of the existence there of a Copper age. No argument upon this or any similar question is attempted. The only proposition here presented is that copper was used in the neighborhood of Lake Superior to make cutting implements of similar form to those of stone, and that, despite the numbers of such implements found, copper did not change the culture of the peoples; it did not establish a Copper age as bronze established a Bronze age in Europe; it was not an epoch-making discovery or invention, and the mode of making and using stone implements by chipping and polishing, as in the purely Neolithic age, was not superseded by the discovery of copper.

Among the many mysteries of prehistoric archæology growing out of mound excavation in the United States, wherein things strange and wonderful but of undoubted genuineness and antiquity are found, none are more unexplained than the thin sheets of copper wrought by repoussé work into curious and unknown devices found in mounds and earthworks in widely separated regions of the country.

Etowah plates.—The principal specimens come from the Tumlin mounds on the Etowah River, near Cartersville, Georgia (Plates 59, 60). They have been figured in the reports of the Bureau of Ethnology[1] and in the author's paper on "The Swastika."[2] Of these specimens the principal comment made by Professor Thomas is in approval of that of Professor Holmes,[3] that "in all their leading features the designs themselves are suggestive of Mexican or Central American work." Yet he adds that—

> There are one or two features which are anomalous in Mexican or Central American designs, as, for example, where the wings are represented as rising from the back of the shoulders. The two plates are a combination of Mexican and Central American designs, the graceful limbs and the ornaments of the arms, legs, waist, and top of the head are Central American, and the rest, with the exception, possibly, of what is carried in the right hand, are Mexican.

Professor Thomas continues:

> That these plates are not wholly the work of the Indians inhabiting the southern section of the United States, is admitted; that they were not made by an aboriginal artisan of Central America or Mexico of ante-Columbian times, I think is probable, if not from the designs themselves, from the apparent evidence that the work was done in part with hard metallic tools.

To the latter conclusion the author does not agree. The proposition may be true, but there is no evidence of it.

Fig. 150 represents a figured copper plate from mound *c*, Etowah group showing a human figure.

Later excavations in the Tumlin mounds, made by Dr. Roland Steiner, of Grovetown, Georgia, have brought to light other copper

[1] Fifth Annual (1883–84, figs. 42, 43, 44, and 45, pp. 96–106), Twelfth Annual (1890–91, plates XVII, XVIII, and figs. 186–192).

[2] Figs. 240 and 241, pp. 886, 887.

[3] Science, April 11, 1884.

THIN COPPER PLATE, REPOUSSÉ, HUMAN FIGURE.

Mound C, Etowah group, Georgia.

Twelfth Ann. Rept. Bur. Ethnol., 1890–91, plate XVI.

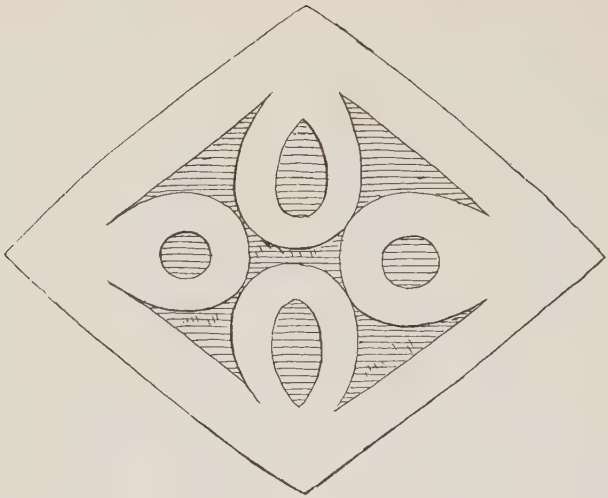
Cat. No. 91117, U.S.N.M. ⅓ natural size.

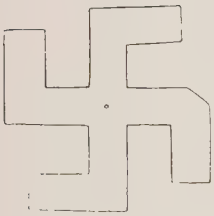
THIN COPPER PLATE, REPOUSSÉ, BIRD FIGURE.

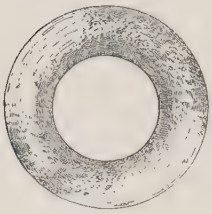
Mound C, Etowah group, Georgia.

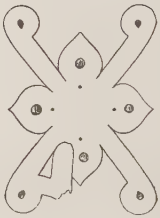
Twelfth Ann. Rept. Bur. Ethnol., plate XVII.

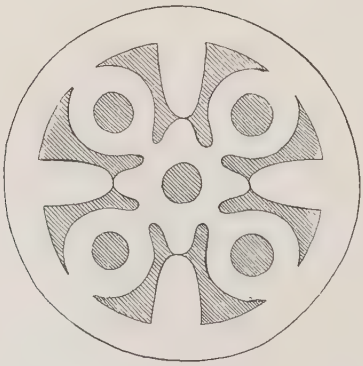
Cat. No. 91116, U.S.N.M. ½ natural size.

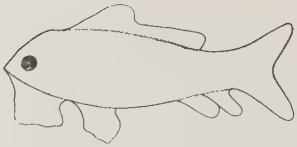












THIN COPPER PLATES REPRESENTING VARIOUS OBJECTS.

Hopewell mound, Ross County, Ohio.

Originals in Field Columbian Museum.

Wilson, Swastika, figs. 244–249.

HUMAN SKULL WITH COPPER HEAD-DRESS (IMITATION ELKHORN).
Hopewell mound, Ross County, Ohio.
Original in Field Columbian Museum.
Wilson, Swastika, plate 13.

plates covered with repoussé work, though not of the same designs as the foregoing. The author would figure them on this occasion did not time press.

Other thinly wrought copper plates have been found in the interior States of the United States, notably Illinois and Ohio. Fig. 151 represents a copper plate taken from an Illinois mound, with an eagle or bird upon it. Fig. 152 represents another copper plate, also from Illinois, on which are two naked human figures in grotesque attitudes, as though of astonishment or fear.

Fig. 150.

HUMAN FIGURE. THIN COPPER PLATE, REPOUSSÉ.

Mound C, Etowah group, Georgia.

Thomas, Twelfth Ann. Rept. Bur. Ethnol., 1890–91, p. 304, fig. 186. Cat. No. 91113, U.S.N.M. ⅓ natural size.

Hopewell mound art.—The Hopewell mound, near Chillicothe, Ross County, Ohio, was excavated by Prof. Warren K. Moorehead for the benefit of the Department of Ethnology at the World's Columbian Exposition, Chicago. It was an immense construction, 530 feet long, 250 feet wide, with an original height of 32 feet, but when opened was only 16 or 18 feet to its original foundation. A considerable number of elaborately wrought copper objects were found at or near the bottom of the mound and in the center. Plate 61 represents most of these. All were flat, thin, smooth, though not polished, and had been cut into the various designs as represented. One of the objects is the swastika, of which five specimens were found; the rest were mostly geometric designs cut out of thin copper plates as shown. There were no engravings or repoussé work on any of the copper objects found, with the exception of one, a spool or pulley-shaped ornament which was hammered and crimped as shown in fig. 153. Two other objects were found in copper, and are proper to be introduced on account of their art. Plate 62 represents

a human skull with a unique head covering made principally of copper. It consisted of a large sheet 16 or 18 inches long, intended to be bent over the head, from the edges of which, about the center on either side, sprang a pair of imitation elk horns, as shown in the plate. They were not real elk horns, but had been carved out of wood to represent elk horns. The wood of the horns was entirely covered with thin sheet copper neatly and artistically placed so as to have the appearance of solid copper, and it was not until after a considerable examination that their real character was detected. The antlers were 22 inches high and 19 inches across the upper points. Plate 63 represents another object of a similar type from the same mound; it also is a copper head dress with two short rounded horns springing from the top as shown. They were also covered, but the copper had been broken from the top of the two horns, leaving the naked wood projecting. These latter figures are unique, and their right to a presentation in a paper on art lies in the excellence of the mechanical execution, and the difficulty of performing it. No one who has inspected these objects, and who considers all to have been aboriginal savage work, but would admit them to a place in a paper on prehistoric art.

Fig. 151.

BIRD FIGURE. THIN COPPER PLATE REPOUSSÉ.

Mound, Union County, Illinois.

Thomas, Twelfth Ann. Rept. Bur. Ethnol., 1890-91, p. 309, fig. 192. Cat. No. 91507, U.S.N.M. ⅓ natural size.

Found in the same mound, and associated with the foregoing objects, was a piece of human bone (femur) which bore an engraved design, which is here reproduced (fig. 154) from the pamphlet of Prof. F. W. Putnam and Mr. C. C. Willoughby.[1] On this they based an elaborate system of symbolism, involving an explanation of the "Cincinnati tablet," previously mentioned (fig. 146, p. 491).

Fig. 152.

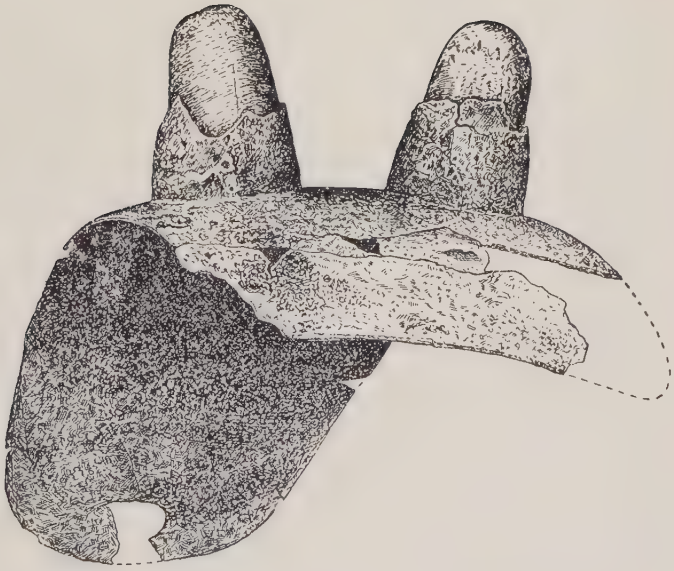
HUMAN FIGURES IN GROTESQUE ATTITUDE. THIN COPPER PLATE, REPOUSSÉ.

Union County, Illinois.

Thomas, Fifth Ann. Rept. Bur. Ethnol., 1883–84, p. 106, fig. 49. Cat. No. 88142, U.S.N.M. ⅓ natural size.

The Hopewell group of mounds was prolific in art objects and it made large and valuable contributions to American prehistoric archae-

[1] "Symbolism in Ancient American Art," Proc Amer. Assn. Adv. Sci., Springfield, Massachusetts, 1895.



COPPER HEAD-DRESS, SPROUTING HORNS.

Hopewell mound, Ross County, Ohio.

Original in Field Columbian Museum.

Putnam and Willoughby, Symbolism in Ancient American Art (Proc. A.A.A.S., XLIV, 1896, p. 305, fig. 4).

ology. Many aboriginal carvings and engravings on bone were found during their excavation. Figs. 251–253 in "The Swastika"[1] represent variously carved birds and animals from these mounds. Other specimens were found, mostly in fragments, of which Mr. Bennett, the artist of the expedition, says:

> These carved traceries or engravings upon bone, even in fragmentary state, evince an artistic aptitude much beyond the mineral and vegetable stain, and, by their almost microscopic delicacy of execution and unfaltering precision of line work, show a high degree of manual skill. Though some are undoubtedly portions of barbaric and desultory design and unsystematic application of indefinite ideas, others bespeak a clearly conceived idea, a definite motive and vigorous execution, not inferior to the predominant motives of early Mediterranean decorative art.
>
> They are clearly not of an illustrative or imitative design, either realistic or conventional, but created design, founded on purely mechanical motive with good conception; and it is regrettable that no complete examples remain to correct artistic valuation of the purpose of the whole.[2]

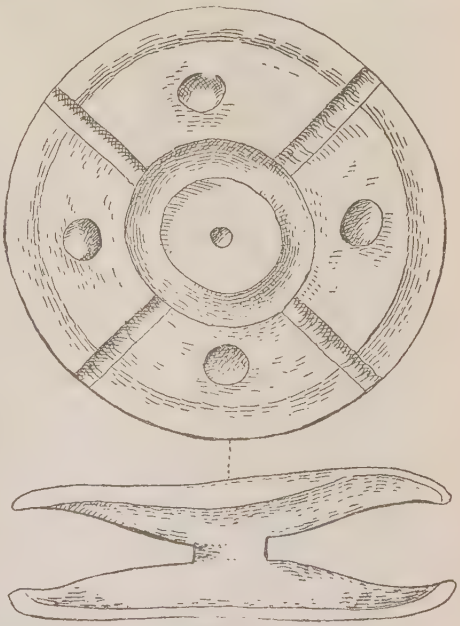


Fig. 153.

SPOOL OR PULLEY-SHAPED EAR ORNAMENT, COPPER.

Hopewell mound, Ross County, Ohio.

Wilson, Swastika, p. 891, fig. 250. Natural size.

The recent excavations by Mr. Clarence B. Moore in the Florida sand mounds brought to light several of these thin copper plates with curious designs wrought upon them.[3] The United States National Museum possesses a number from various States in the central United States. The designs, however, are not of the same character as most of the foregoing. They do not represent human or animal figures, but tend to lines, dots, concentric rings, and designs more or less geometric.

Gold and Silver.

The world knows enough of the barbarous peoples of historic times, whether ancient or modern, to enable it to predicate with reasonable certainty the use of gold and silver for personal adornment among the

[1] Wilson, Report U.S.Nat.Mus., 1894, pp. 757–1011.

[2] "Hopewell Group," Warren King Moorehead in The Antiquarian, July, 1897, p. 179.

[3] Journal of Academy of Natural Sciences of Philadelphia, X. The specimens are in the museum of the Academy of Natural Sciences in Philadelphia.

peoples of prehistoric times. Prehistoric archæologists have had their attention directed to these precious metals, and accordingly have sought for them when excavating prehistoric settlements. It is not intended in this paper to give a full or even reasonably complete list or description of finds of gold or silver. Only enough will be presented to show the character and style of the art work and the capabilities of the artists.

Fig. 154.

AN INCISED CARVING ON HUMAN FEMUR.

Hopewell mound, Ross County, Ohio.

Putnam and Willoughby, Sym. Anc. Amer Art. (Proc. A. A.A S., XLIV, 1896, p. 302, fig. 1. $\frac{2}{3}$ natural size.

EUROPE.

Brittany.—The use of gold can be traced in western France through the Neolithic period, principally in the form of collars and bracelets. Fig. 155 represents one of these collars. It was found in one of the dolmens of Roc'h-Guyon or Rondessec, at Plouharnel-Carnac (Morbihan). The discoverer was M. Lebail, the keeper of the hotel at Plouharnel, where the author spent some months at various times in prehistoric investigations, visiting this monument upon sundry occasions. The ornament is native gold, about an inch and a half in width, and cut longitudinally into a dozen strips extending one-third the way round. This might have been done by a sharp flint, used chisel and not saw fashion. There were two of these collars, each weighing about 140 grams. They had been intentionally deposited in a rude pottery vase with cinders, ashes, and charcoal, which had been walled up in one corner of the chamber. One of the collars was sold to M. Costa de Beauregard (Haute-Savoie), but the other was kept by Lebail at his hostelry as an attraction to visitors. Lebail was succeeded by his son-in-law, M. Felix Gaillard, now the inspector of prehistoric monuments for his neighborhood, and he has greatly increased his collection. Among other specimens are two gold bracelets, one of which is represented in fig. 156, found in a dolmen near Belz (Morbihan), and a finger ring fromthe department of Ille-et-Vilaine.

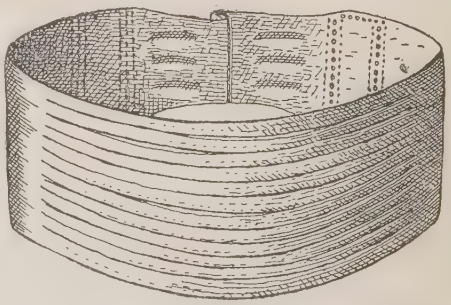


Fig. 155.

GOLD COLLAR.

Dolmen at Plouharnel-Carnac.

Original, collection Gaillard, Plouharnel-Carnac, Morbihan, France. $\frac{1}{2}$ natural size.

While it is not asserted that the working of gold was carried on in the Neolithic period, yet the foregoing patterns are different from most of those of the Bronze age. Many, apparently belonging to the Bronze age, are simply round rods or bars of gold of sufficient length to encircle the wrist, and which have been bent to that form (fig. 157). Others have been made into thin sheets, crimped around the edges (fig. 158). Both these styles are identical with the bronze bracelets, and the places in which they were found and the objects with which they were associated concur in their assignment to the Bronze age. There are also many objects in gold—torques and bracelets—which show a different method of working, and are supposed to have been of later date. Some were round, heavy, decorated, marked with zigzag, herringbone, chevron, etc. (fig. 159, *a*, *b*), some of them after the fashion of a coil of rope (fig. 160, *a*, *d*), in others the ends were hammered square and enlarged (fig. 160, *b*, *c*).

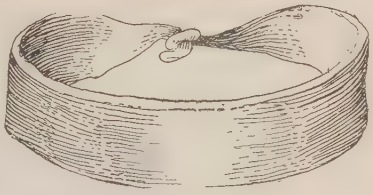


Fig. 156.

GOLD BRACELET.

Dolmen near Belz, Morbihan, France.

⅔ natural size.

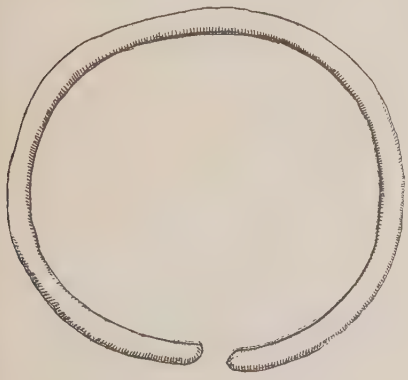


Fig. 157.

BRONZE BRACELET OF ROUND ROD, THE COMMONER PRIMITIVE FORM IN BRONZE AND COPPER THROUGHOUT THE WORLD.

½ natural size.

Ireland.—The Archæological Museum in Dublin is probably the richest in gold objects of any in Europe. One of its attractive displays is a series of bracelets, running from extremely large to extremely small. They consist of a rod of gold, larger in the center, tapering gradually to the ends, but with a head hammered down and spread, the ends being then brought more or less together (fig. 161). In the larger of these the rod would be nigh half an inch thick, and from that down. Some are large enough to go over the hand and so be worn on the wrist, or even on the arm, while the smaller ones in the series would not go on the little finger. The evident fact that these small ones, though practically reproductions of the larger, are quite too small for any possible use as bracelets or

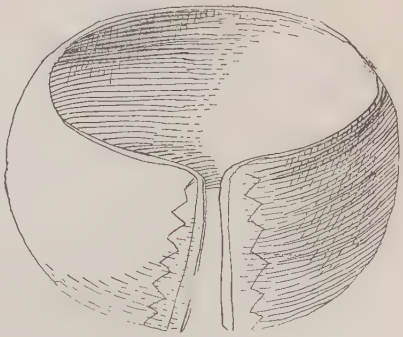


Fig. 158.

BRONZE BRACELET OF THIN METAL WITH CRIMPED EDGES.

Standard style during the bronze age in Europe. ⅓ natural size.

rings, and the additional fact that in some of the countries on the west coast of Africa manillas somewhat resembling these have been used as currency, has caused it to be said that these were not bracelets, but were money, and the name of ring money has been given to them. It is evident that these latter specimens belong to later prehistoric peoples. In Ireland these have been called Celtic; in France, Gaulish.

Laissegraisse.—Fig. 162 represents one of these Gaulish torques or collars, while fig. 163 represents a bracelet. They are both of the same style, and were found about 1885 in the little hamlet of Laissegraisse, department of Tarn, France, by a peasant while digging in his vineyard. The author happened at that time to be in the city of Toulouse, and accepted the kind offer of M. Cartailhac to visit the locality and inspect the objects. They were found at about 18 inches beneath the surface, just below the ordinary reach of plow or mattock, and it was only an

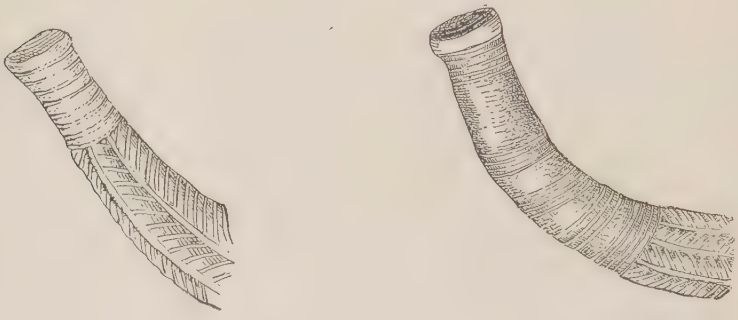


Fig. 159.

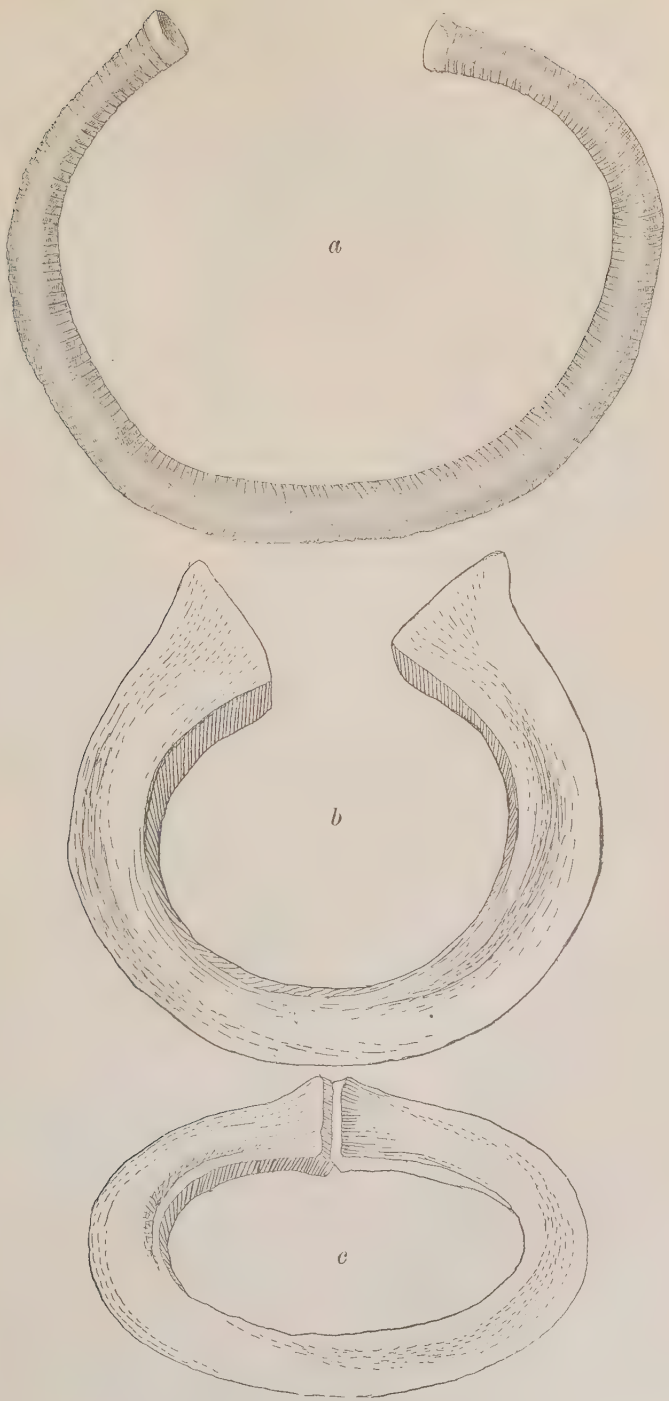
ENDS OF HEAVY BRACELETS, ARMLETS, TORQUES, ETC., IN GOLD OR BRONZE, SHOWING STYLE OF DECORATION.

Europe.

$\frac{2}{3}$ natural size.

extraordinary and accidental stroke of the latter that showed a brilliant spot at the bottom of the hole. There were evidences of prehistoric man in the shape of flints more or less worked, fragments of pottery and bits of charcoal, but none had any particular relation to the gold objects. They were not protected by box or inclosure in any way. It will be seen from their work that they had been highly decorated, made in repoussé, and soldered together. The details of the ornaments (fig. 164, *a*, *b*, *c*) and the mode of fastening (fig. 165, *a*, *b*, *c*) evince a fair degree of civilized mechanical skill in their execution.

Golden cinctures have been lately (1893) found at Coutras, and are now in the Museum of Bordeaux. They are simply twisted coils with large button-like ends. Industrially they resemble those from Laissegraisse, but artistically, they are much inferior. They were found *en cache*, forming part of the stock of a goldsmith or a mint worker, comprising about four hundred pieces, weighing nigh 10,000 francs in gold.



Figs. 160 *a*, *b*, *c*.

GOLD TORQUES, COLLARS AND BRACELETS.

Vieux-Bourg Hinguet (Côtes-du-Nord), France.

a. ½ natural size. *b*, *c*. ¾ natural size.

The manufacture and use of gold ornaments continued in these two countries, Ireland and France, to a much later date. An inspection of the beautiful objects of precious metals in the museum at Dublin will show the Celtic work improving in mechanical skill and artistic design until 1000 or 1200 A.D. Mr. Edmund Johnson, an accomplished jeweler and goldsmith in Dublin, made a reasonably complete series of reproductions of these objects which he displayed at the World's Columbian Exposition, Chicago. In France the advent of the Romans changed the style of art in precious metals. The golden patera of Rennes, with its fibula and chain, belonging to the third century A. D., were all high Roman art. It has been described by the author.[1]

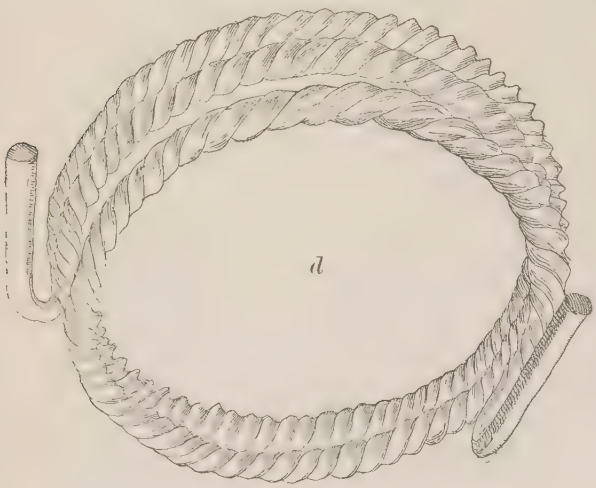


Fig. 160 *d*.

GOLD TORQUE.

Weight, 389 grams.

Rennes (Ille-et-Vilaine), France.

Musée Cluny. ⅓ natural size.

AMERICA.

The North American Indian does not, during prehistoric times, appear to have worked or used gold or silver for either ornament or utility. There have been a few pieces of silver found within the district occupied by him, but all, either from their association or mode of manufacture, have suggested European influence. The pieces of gold found within this district are much fewer in number and are subject to the same remark.

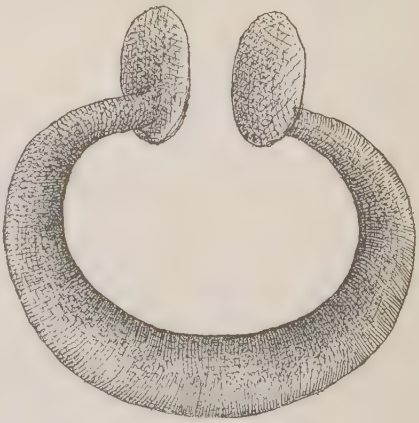


Fig. 161.

GOLD BRACELET, ONE OF A SERIES FROM LARGE TO SMALL.

Museum of Science and Art (Archæology), Dublin, Ireland.

⅓ natural size.

Whatever criticism or denial may be made of the foregoing statements in the interest of civilization or technology, yet it stands practically true in its relation to art work.

[1] Report U. S. National Museum for 1894, pp. 609–617.

Fig. 162.

GOLD TORQUE, GAULISH.

Laissegraisse (Tarn), France.

Musée Toulouse. ½ natural size.

Fig. 163.

GOLD BRACELET.

Laissegraisse (Tarn), France.

½ natural size.

Mexico, Central and South America.—But going southward through Mexico into Central and South America the affair becomes changed. We all know, from the Spanish historian and discoverers, how the Conquistadores, as soon as arrived on the shores of the Western Hemisphere, began the mad search for gold. The Spanish adventurers who landed within the territory now occupied by the United States, like

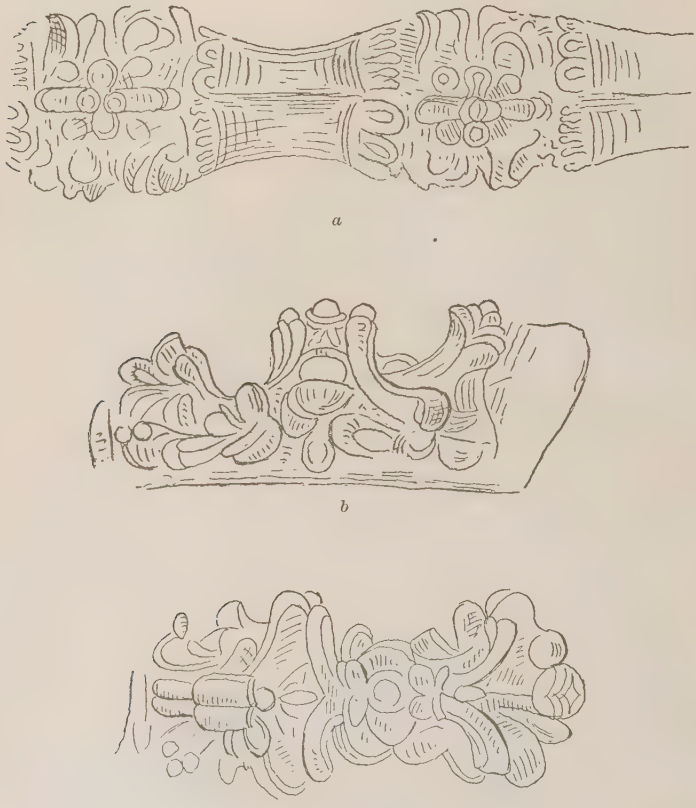


Fig. 164.

DETAILS OF THE ORNAMENTATION OF FIGS. 162, 163.

Natural size.

Ponce de Leon and De Soto, give frequent descriptions of gold and copper; the latter appearing in great plenty, the former much less, and the similarity of appearance being such that, in the paucity of their communicating languages, they were unable to distinguish the differences between the two metals.

Plate 64 represents certain gold objects in the United States National Museum from Chiriqui, and plate 65 represents a similar set from Antio-

GOLD OBJECTS FROM CHIRIQUI, COLOMBIA, SOUTH AMERICA. STRING OF BEADS AND BELLS AT BOTTOM ARE FROM PERU.

Cat. Nos. 148148–148172, U.S.N.M. ¾ natural size.

GOLD OBJECTS FROM QUIMBAYA, ANTIOQUIA, COLOMBIA, SOUTH AMERICA.
Some are casts and some originals
Cat. Nos. 147738 147746, U.S.N.M. $\frac{7}{15}$ natural size.

GOLD ORNAMENTS, FROM COSTA RICA.
Originals in National Museum, San José.
⅔ natural size.

GOLD OBJECTS.

Chibcas

Ruiz-Randall collection, from Bogota, Colombia, South America. $\frac{1}{10}$ natural size.

quia, both in Colombia, South America. Plate 66 represents a chosen collection of gold ornaments from Costa Rica, from a photograph furnished by Señor A. Alfaro, the objects being from the Costa Rican Museum. The art of gold working is shown by the objects in the plates and does not require lengthy or detailed description. Plate 67 represents a series of gold objects reported from the Chibca tribe of Indians, Bogota, Colombia, belonging to the Ruiz-Randall collection.[1]

It is not necessary to discuss the question of art any further in this connection, especially as has been mentioned in the introduction, it has been treated in its relation to certain materials by various persons,

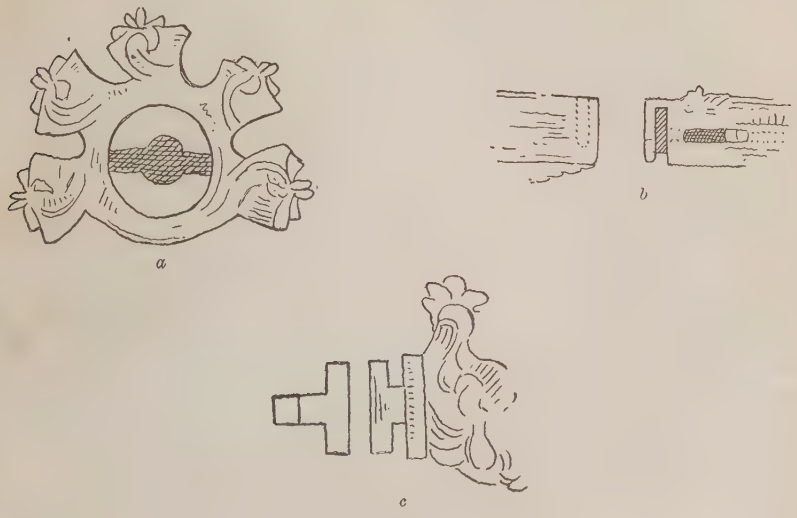


Fig. 165.

DETAILS OF MODE OF FASTENING COLLAR AND BRACELET, FIGS. 162, 163.

Natural size.

especially by Prof. W. H. Holmes, formerly of the Bureau of Ethnology, equally renowned as an archæologist and as an artist, and by his familiarity with these two subjects is probably as well qualified to deal with it as any one in the United States.

Since the preparation of this paper the following volumes on aboriginal art in North America have been published: "Decorative Art of the Indians of the North Pacific Coast," by Franz Boas, in the Bulletins of the American Museum of Natural History, Vol. IX, Article X, pp. 123–176, New York, May 24, 1897; and "The Graphic Art of the Eskimos," by Walter James Hoffman, M. D., in Report of the U. S. National Museum, 1895, pp. 739–968.

[1] Century Magazine, October, 1891, XLII, No. 6, pp. 879–892.

III. PREHISTORIC MUSICAL INSTRUMENTS.[1]

Music is a dualism. It is formed of the conjunction of two elements; the one purely musical, the other poetical; the one sensuous, the other spiritual or intellectual the one owing its origin and development to instruments and based on the mer animal delight in sound, the other owing its origin and development to language and based on the fusion of the emotional and intellectual sides of man's nature.[2]

It has been asserted that the origin of vocal music was coeval with that of language, and that the construction of musical instrument dates with the earliest inventions suggested by human ingenuity. Those who make these assertions do so simply upon theory, and when pressed for their authority would be compelled to admit that actual knowledge or information upon the subject does not exist. What can be affirmed is that sound made by the prehistoric man of the earliest epoch might have been rhythmic and so possessed one of the elements of music. The other elements—melody, dynamics, and harmony—followed in the course of civilization, among some people at a faster and among others at a slower rate.

Vocal sounds are incapable in themselves of perpetuation. When the vibrations made by the human voice have ceased, the incident is closed and the evidence lost. It is, therefore, in the absence of any written testimony, impossible to identify the practice, or even the existence, of vocal music in prehistoric times. We are driven to an exclusive consideration of musical instruments, and if these should fail us, we would be without evidence.

Miss Fletcher[3] says:

As to the birth of musical instruments, I can not even touch upon the raison d'être of their invention, but I may call attention to their controlling influence; they have become at length master of the man who made them. There is no race or people possessing a theory of music who have not been indebted to musical instruments for the means by which their theory has been worked out. * * * Before the instrument had been evolved and man could listen objectively to his music, during the long period when his voice was his only mode of expression, his mind was not stimulated to make observations upon the relations of one to the other. He may be said to have possessed no conscious method and to have followed no known or accepted artificial rules of composition of his song.

This relates entirely to prehistoric times, and its author accepts musical instruments as the only means of perpetuating the sounds so they can be reproduced and studied.

[1] Much of the material descriptive of prehistoric musical instruments and the scales in the Western Hemisphere contained in this chapter was prepared by Mr. E. P. Upham, assistant in the division of Prehistoric Archaeology to whom credit as joint author should be given.

[2] Rowbotham, History of Music, I, Introduction, p. xi.

[3] Indian music, in Music, June, 1894, p. 189.

It is the intention in this chapter to leave aside all speculation as to the origin, theory, practice, philosophy, and poetry of music, and to deal only with music as one of the fine arts of prehistoric times; the study thereof to be based upon such knowledge as is obtainable from prehistoric musical instruments.

There have been some students, even some professors, who, wiser than their own generation, declare music to be a manifestation of an innate principle in man. The author does not contradict the proposition, but he denies the knowledge and authority of these wise men who say so.

While the proposition may be true, yet the statement is valueless, because it is only the assertion of these gentlemen, the truth of which they do not know. It is, on their part, theoretical, and an assumption which should be proved before being stated as a fact. It is *a priori* argument, and as such is vicious. Investigation has demonstrated that similar assumptions have been erroneous. Illustrations of this can be shown in the life history of Paleolithic man, deduced from discovery. No person would be justified in the assumption, without proof, that the man who lived in caves and apparently had no more notion of civilization than the wild beasts with which he disputed the possession thereof, who knew only to use stone implements, and these made sharp by chipping, and who did not know to rub one stone against another to make it either smooth or sharp—no person would be justified in assuming that this man was capable of making artistic designs representing almost the entire fauna of his district; yet in an earlier portion of this paper we have seen that he did this thing. It has been said or assumed, without knowledge for foundation, that man in his earliest condition had an appreciation of the rhythmic character of music; but, in opposition to this, we will show that this same Paleolithic man, who developed an artistic taste in such high degree, had no taste for and did not employ even the rhythmic principle of music. The most we have found of his ability in this direction was the simple whistle, made from the phalange of the reindeer (p. 524). While it is not impossible that this might have been used in cadence and for rhythmic representation, yet there is no known fact on which to base the belief. No reason has been given, and I take it no reason can be given, for these manifestations on the part of the early man in favor of one kind of art and not of another kind. This becomes less subject to the a priori theory herein denounced when we consider that to a large extent the contrary appears in the higher civilization of the Neolithic period, which follows the Paleolithic.

The object of this paragraph is to protest against the *a priori* method of argument so often used by the student or professor who, studying or knowing the instincts or capabilities of modern man, argues therefrom that man in a state of nature did the same. It is not denied

that one people may have developed its culture in one direction and not in another, even retrograded in some respects while they advanced in others, but no person is justified in assuming that, because one primitive people developed their civilization in a particular direction, therefore all peoples did the same. The unity of human development and civilization is a myth. We have but to look over the modern world and to compare the peoples of historic times, some of them of high civilization, to demonstrate this want of unity. It is sufficient as an illustration to cite the different families of the Aryan race, which originally had a single stock of language if they did not have a single stock of blood; then compare these families together and note the differences in their civilization, the Greeks with the Romans, and they with the Celts, and the Celts with the Goths, and so on to the Lets and the Slavs, and all these with the Zends and Persians. If this comparison be somewhat difficult and not apparent at a glance, we may take the descendants of these various peoples as they exist at the present time; compare not simply the Latins with the Germanic peoples, but the Latins with themselves; the differences between Italy and France, and of France with Spain, or the ancient Saxon with the Anglo-Saxon of England. These differences are almost as great as though there never had been any relation between them; almost as great as it is between these Aryan peoples and the Semitic, between whom there has never been any racial relation. These differences apply to their fundamental civilization and ramify through every fiber of the respective bodies politic. In sociology the distinctions in religion, marriage, government, law, inheritance, is as great between Italy, France, and Spain on the one hand, and Germany, Holland, and England on the other, as it is between either or all these and the same institutions in China and Japan. He would be a poor historian who, proceeding upon the theory of the similarity of human nature, and having written a history of any one of the nations and peoples just mentioned, should assume that, therefore, he was in possession of knowledge of the sociologic conditions of any other. It is useless to continue this argument. Its only purpose has been to enter a protest against this method of reasoning when applied to the prehistoric peoples of whom our only knowledge consists of such monuments, tombs, residence sites, implements, utensils, and objects as have been or may be found on or in the earth.

Rhythm was the first element of music. The drum and the rattle of the savage give forth but one tone, and all their music consists in strokes or shakes, repeated at greater or less intervals of time and with more or less regularity and force. The earliest prehistoric whistles gave but a single note, but were afterwards increased to two and five notes, and while they could increase the force they were scarcely able to make a melody except of the most simple kind. Drums and rattles

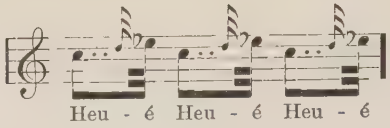
might have had a different pitch and have given different notes, but there is nothing to show that they were intentionally so. It is much more probable that they were made to produce tones of strength, clearness, sweetness, etc. When prehistoric man understood and attempted to make melody he had advanced one grade in culture.

Frequent attempts have been made to give written representations of the rude music heard among savage or barbarous nations, but these should always be received with distrust, not so much from want of confidence in the observers as from want of accurate representation of sounds heard. The usual practice is to try to write the sounds according to our modern musical notation, but it must be borne in mind that this notation only corresponds with our own peculiar scale, which has no signs to represent other sounds. Hence, when we see the chants of a savage tribe expressed in our notation we should not take it for granted that they actually used the intervals of our scale. We can only assume that the observer wrote something as nearly like what he heard as he could find means of expression.

In the music of savage tribes they used a few sounds, differing in pitch, but in most cases there is no sufficient reason to believe that these sounds correspond, as regards their gradations, with any regular musical system. To get traces of such a system we must look to peoples more civilized, and we soon find not only a considerable advance in the knowledge of the sounds used, but, what is of more importance, a more accurate definition of them. This definition is aided when, as often happens, they have introduced musical instruments with fixed tones.

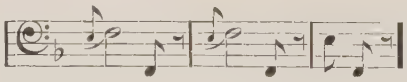
There has been much speculation among philosophers and scientists as to the origin of music. Charles Darwin, Herbert Spencer, Letourneau, De Mortillet, and others agree that music originated with the cry of the human voice, and that it developed from vocal noises. Letourneau continues the simile by suggesting that the noises of nature were the originators of musical instruments. The others treat of vocal music, and their investigations and theories are devoted almost exclusively to an explanation of its origin. Darwin and Spencer differed as to the particular class of vocal noises which served as the origin of music. Darwin attributed it to the amatory class, that is, those sounds which the male makes during the excitements of courtship and in order to charm the female, and he thought that not only love music, but music in general was the resulting combination of these sounds. Spencer disagreed with the latter reason and was of the opinion that music had its germs in the sound which the voice emits under excitement, and that it eventually obtained its particular character according to the kind of excitement. Darwin, true to his development theory, believed that "the vocal organs were primarily used and perfected in relation to the propagation of the species." Spencer, agreeing to the excitement

of love as a partial cause, extends it to include all other excitements to which animal feelings are susceptible.

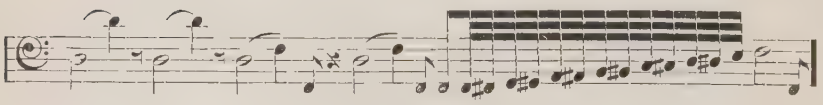
The infantile cry, which it is said was the origin of music, has been reduced to writing and placed in the form of notes on the staff.

CHILD CRYING.

Rossini, in his opera of "Semiramide," introduced into one of the choruses with great effect the cries and squeals of a party of children.

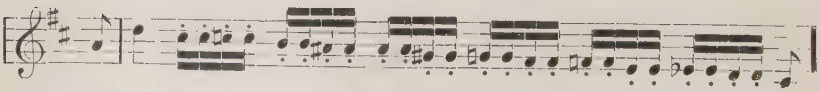
As the human cry grew it changed to represent passion, and possibly by onomatopes it became articulate and so grew into language. With this came modulations of the voice, and Didero, with the others, says the cry of an animal in passion was the fundamental principle of music. Some animals, especially birds, have the power of music without language, but it is claimed that they can express by their music the same sentiments of passion as does man. It has, therefore, been declared that music does not belong exclusively to man, and it is certain that it exists among animals independent of articulate language. An observing student of nature, Mr. A. T. Camden Pratt,[1] has reduced some of the cries of our domestic animals to form, and has written them out in music.

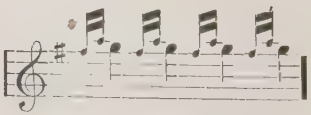


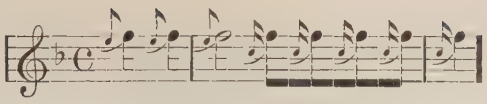
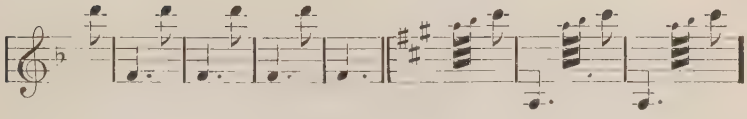
BULL BELLOWING.

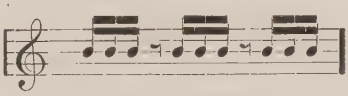


COW LOWING.

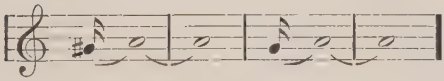


HORSE NEIGHING.

DOG YELPING.

[1] Strand Magazine, December, 1893, and January, 1894.

DOG BARKING FOR JOY.

DONKEY BRAYING.



GRASSHOPPER CHIRPING.



GNAT BUZZING.

Modern musical works not infrequently reproduce the songs of birds. "Listen to the nightingale" is an illustration which, however, only serves to show the superiority of the bird over his brother animal, man. The lark, the blackbird, the thrush, all have their songs, which, repeated again and again, are recognizable and known of all men, while the canary, the mocking bird, and the catbird sing not only their natural songs, but can be taught to sing many variations, if not to execute entirely new melodies. The author has seen a piece of music set to imitate a cackling hen and crowing cock, and all the world remembers Ole Bull's "Barnyard orchestra," as played on his violin. Darwin reports to have heard a gibbon which modulated his voice to the extent of an octave, and, according to Savage, the black chimpanzee (*Troglodytes niger*) gathers in troops at certain places and gives musical concerts by striking wood of various kinds—that is to say, trees standing, logs lying, or branches spreading—with a rod or pole, keeping time and forming a sort of melody or harmony of the different tones emitted from the object struck. If this be true these would seem to be musicians in the lowest scale and this to have been the most primitive musical instrument.

Musical instruments of percussion are the most simple, and the theory has been accordingly announced that they were the first to have been invented—that is, they were the earliest factors in human culture, and the first to be used among primitive peoples. The next in order of complexity, and accordingly in order of invention and evolution, were wind instruments. Rowbotham[1] divides them into types, of which his representatives are the drum, the pipe, and the lyre. Under

[1] History of Music, Book I.

the first head fall rattles, gongs, triangles, tam-tams, castanets, tambourines, cymbals, all instruments of percussion; under the second head fall flageolets, flutes, hautboys, clarionets, bassoons, bugles, all wind instruments; under the third head fall all stringed instruments. He makes these types representatives of three distinct stages of development, through which, in the order named, he says, all prehistoric music has passed. "As in the geologic history of the globe the chalk is never found below the oolite, nor the oolite below the coal, so in the musical history of mankind is the lyre stage never found to precede the pipe stage, nor the pipe stage to precede the drum stage. In keeping with this is the fact that the savages sometimes have the drums alone, but never the pipe alone, or the lyre alone, for if they have the pipe they have the drum too, and if they have the lyre they always have both the pipe and drum."

Pursuing this idea, Rowbotham[1] devotes many pages to descriptions of "savages," who are in the respective stages of musical culture just described, and he gives the author or book from which he has obtained the information:

Savages with *no* instruments:

Veddahs of Ceylon: Tennent's History of Ceylon.

Mincopies of the Andamans: Mouat's Andaman Islands.

Inhabitants of Terra del Fuego: Narrative of the Surveying Voyages of H. M. SS. *Adventure* and *Beagle*. II.

Savages with *only the drum:*

Australians: Eyre's Discoveries in Central Australia, II, pp. 228, 2, 237, 32, 331; Grey's Journal of Two Expeditions of Discovery in Northwest and West Australia, II, p. 305.

Eskimos: Parry's 2d Voyage, p. 530; Crantz, History of Greenland, I, p. 171.

The Behring's nations generally: Whymper's Alaska, p. 143, particularly the Malemutes and Kaveaks.

Samoyedes and other Siberian tribes: Richardson's Polar Regions, p. 335; Smith's Wonders of Nature and Art, London, 1803, II, pp. 277, 264, etc.

Laplanders—until within 200 years: Scheffer's History of Lapland, p. 58.

Savages with *pipes and drums:*

Polynesian Malays: For the Society Islands, see Captain Cook's Voyages, published by John Tallis, I, p. 87. For the Navigator Isles, Turner, Nineteen years in Polynesia, p. 211. For the Friendly Isles, Cook, I, p. 427, and in the common edition, 1st Voyage, p. 397; see also Mariner's Tonga Islands, II, pp. 214, 218. For the Marquesas, Melville's Life in the Marquesas, p. 185. For the Sandwich Islands, where, however, the pipe is absent, Cook, II, p. 250. For the Maories of New Zealand, who are the most advanced of all, Captain Cook, I, p. 196, and generally Ellis's Polynesian Researches, p. 282.

Papuans: Williams's Fiji and the Fijians, I, p. 163; Turner's Nineteen Years in Polynesia, p. 90; Jukes's Voyage of H. M. S. *Fly* (for the Erroob Papuans), II, p. 176; (for the Papuans of New Guinea), I, p. 274, and plate I, p. 277; see Rosenberg's Niew-Guinea, p. 93. And for the Drum Form in the Papuan Archipelago, Shouten's Voyage in Purchas His Pilgrimes I, 2, 100.

Upper Amazon: Bates's Amazons, II, p. 201; Wallace's Travels on the Amazon, p. 504.

Rio Negro: Wallace's Travels on the Amazon, p. 259.

[1] History of Music, I, Introduction, pp. xiii, xiv, xv.

Savages with *pipes and drums*—Continued.

Uaupés: *Ibid*, p. 282.

Tupis: Bates's Amazons, I, p. 311.

Omaguas: Southey's History of Brazil, I, pp. 89, 90.

Neighboring Tribes: *Ibid*, pp. 84, 95; Orellana, in his narrative of his expedition down the Maranon, says, "had 3-stringed rebecks."

Artaneses: Southey, I, p. 139.

Yucanas: *Ibid.*, III, p. 720.

Itatines: *Ibid.*, I, p. 341.

Generally the rest of the Brazilian tribes: *Ibid.*, I, p. 206.

The Aymara Indians of Bolivia and Peru: Forbes, On the Aymara Indians, in Transactions of the Ethnological Society for 1869, p. 233.

The aborigines of Guiana: Brett's Indian Tribes of Guiana, pp. 154, 320 (plate).

Huacho Indians of Peru: Stevenson's Travels in South America, I, p. 403.

Abipone of Paraguay: Dobrizhoffer's History of the Abipones, II, pp. 70, 209, 217.

Patagonians: Narrative of the Surveying Voyage of H. M. SS. *Adventure* and *Beagle*, II, p. 162; R. Brown's Races of Mankind, Art. Patagonians, plate; Muster's At Home among the Patagonians, p. 77.

North American Indians: Catlin's North American Indians, I, pp. 238, 243; Schoolcraft's History of the Condition and Prospects of the Indian Tribes of the United States, II, p. 514; III, p. 486; Catlin mentions "lutes" twice in his book (I, pp. 38, 142).

Savages *with lyres have pipes and drums:*

Dyaks of Borneo: Marryat's Borneo and the Indian Archipelago, pp. 84, 133 (plate); St. John's Life in the Forests of the Far East, I, p. 118.

The Khonds of Khondistan: Campbell's Narrative of Thirteen Years' Service among the Wild Tribes of Khondistan, pp. 16, 164.

The Finns: Pinkerton, I, p. 473.

The Tartars: Mary Holderness's Notes relating to the Manners and Customs of the Crim Tartars; Clarke's Travels in Russia, Tartary, and Turkey, p. 316; New Edinburgh Review, 1822, p. 518.

The Cossacks: Atkinson's Travels on the Upper and Lower Amoor, p. 167.

The Turcomans: Chozdko's Popular Poetry of Persia, pp. 62, 419.

The Hindus: New Edinburgh Review, 1822, p. 525.

In continuation of his theory, Rowbotham adds instances of the dropping out of earlier forms of musical instruments, where the more primitive, instead of being used in conjunction with those of the higher order, were superseded by them.

Drums were in use in Lapland until 1600, yet in 1732 they are reported as having entirely died out.[1]

He says the same is true of the Bushmen in South Africa, that they used the drum in 1800,[2] but now have only pipes and horns.[3]

The Muras on the Amazon have only horns, but they are Tupis, and Tupis have drums.[4]

In Iceland the drum and pipe dropped out about three hundred years ago, and there is nothing now in use but the lyre.[5]

[1] Scheffer's History of Lapland, p. 58; Linnæus' Tour in Lapland.

[2] Burchell's Travels in the Interior of South Africa, II, p. 87.

[3] Chapman's Travels into the Interior of South Africa, I.

[4] Bates's Amazons, II, p. 10; *Ibid*, Caishánas, p. 376.

[5] Von Troil's Letters on Iceland, in Pinkerton, I, p. 652.

He says in his appendix (A), page 185:

I had prepared a catalogue of the African tribes with which we are acquainted, to discover whether the absence of stringed instruments prevailed in the center, the north, or in what direction it might be, of the continent. * * * But this tabulation I was obliged to discard, owing to the conflicting accounts of travelers; and, without endeavoring to trace the topography of the instruments, let us be content with the broad assertion that most of the tribes of Africa are in the lyre stage, and some are prematurely in it; that is to say, they are unacquainted with the use of pipes, which, in all strictness, should have preceded the knowledge of strings.

And he acknowledges his perplexity:

We have found that the lyre belongs to a very high stage of human development. We have found it in the hands of barbarians who were just emerging into civilization; yet in Africa we find it known to the most degraded savages.

This statement by Rowbotham throws doubt upon the correctness of his assumed order of development.

The collections of musical instruments in the United States National Museum and in the Royal Conservatory of Music in Brussels seem to verify his statement of the prevalence of the lyre among certain tribes of Africa where the pipe, or pipe and drum, are absent.

All this goes to show the difference between theory and fact, and is complimentary to Mr. Rowbotham in recognizing it.

Wallaschek wrote[1] after Rowbotham, and assailed strongly his theory of threefold development of aboriginal musical instruments. He denied the drum to have been the earliest or first invented, and asserted that which is demonstrated in this paper, that wind instruments (whistles, flageolets, and horns) were first invented and antedated drums. He reversed Rowbotham's order of simplicity and argued that the lyre or harp of Africa, formed as it might have been from a bent twig or the two branches of a tree with a string stretched taut between the ends, was not only more primitive and easier and quicker made, but, as confessed by Rowbotham in his appendix, it was in fact invented and in use among the most degraded savages of the country; that it spread over a large portion of the continent of Africa before the pipe or drum, and that it was in use among many other tribes in connection with pipes, but without drums. He cites the fact that the shepherd boy can with ease and in a short time, while tending his flocks, make, with the aid only of his pocketknife, a willow whistle, which is not difficult to be transformed into a flageolet of considerable musical scale; while all drums, so far as known, among primitive peoples, whether prehistoric, as shown in this paper, or modern, as among primitive or savage peoples, are machines or instruments of considerable complexity, requiring labor and thought, with much preparation, in order to perfect them. The log must be hollowed and wrought out, and is usually decorated in a more or less elaborate manner (fig. 233). The skin drum requires the preparation of the hoop and then of the skin, both of which require

[1] Primitive Music: Its Origin and Development, with Songs, Instruments, and Pantomimes of Savage Races.

considerable thought and time and can never be made impromptu or for an emergency.

Wallaschek declares that, both for simplicity and ease of manufacture, the pipe and lyre are in advance of the drum, and that the discoveries in antiquity and investigations in ethnography show them to have come earliest into use among both prehistoric and primitive peoples, and adds:

> I can find nothing but speculative reasons and common consent for the drum being regarded as the most ancient instrument.

He continues (p. 87) his investigations among the various tribes and nations of primitive and savage peoples to demonstrate the error of Rowbotham's proposition and to show that the use of the pipe and lyre—that is to say, of wind and stringed instruments, without the drum—is quite as frequent and prevalent as is the contrary.

The authors are aware of the mass of literature on the science and practice of music, how historians and discoverers of primitive or savage peoples have reported, in many volumes, the music they have heard and the instruments with which it was made. These have not been followed nor any of their theories adopted. The sociologic or scientific sides of music among primitive or ancient peoples have been avoided. The authors have contented themselves with a description of prehistoric instruments and of such notes or tones as could be produced by their manipulation.

It was reserved for the white race to develop in times of antiquity the true art of music as it is understood at the present time, but the different nations composing this race have varied much in their notions as to the solution of the problem.

The Egyptians made music which, judging by the representations left of their musical performances and instruments, had considerable extent and variety. The exact nature of it can only be made out by ingenious inferences, and historians are at issue about their significance. It seems clear, however, that they acknowledged the octave, and that it was largely subdivided.

The music of the Chaldeans, Babylonians, and Phenicians may be assumed to have been of a similar character, the octave being also traced among them. Assyrian bas reliefs on monuments dating from 1000 B. C. represent musical instruments which must have been older, and possibly many centuries older, than the monuments on which they appear. Carl Engel[1] shows the intervals of the huayra-puhara[2] of the ancient Peruvians. Instruments of this kind, of reed or stone, have been found in ancient tombs. One in the British Museum has a double row of reed pipes, of which one is open below and the other closed.

The Hebrews attached great importance to their music, but there appears no means of getting any definite information as to its tonality.

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[1] Music of Most Ancient Nations, p. 7; *Ibid.*, pp. 13, 15, No. 7, Music.

[2] See fig. 325.

The music of the Arabs seems to involve extraordinary complications, and has furnished endless occupation for musical historians and theorists. The most interesting fact in regard to it is that the principal intervals of our scale, namely, the octave and fifth, were also the most important intervals with them. But the resemblance ended here, for their octave was divided into sixteen, or, according to some authors, into seventeen parts, and these not always equal, so that their music must have been very different from anything we are accustomed to. Sanscrit literature contains traces of a musical system in India some three thousand years old, which is still cultivated there. They have also the octavo division, which is subdivided theoretically into twenty-two parts. Their practical scale consists of seven degrees, among which the twenty-two theoretical intervals are unequally divided. The notes in the usable scale admit of many changes, forming distinct modes, and the system generally has many analogies with that of the Greeks. It is worthy of remark, however, that, judging by the frets on their principal stringed instruments, the subdivision of the octave by the fifth and fourth is acknowledged.

Another Aryan branch, the Persian, interests us because, so far as the early history of nations can be made out, their music seems to have been the remote ancestor of our own. The Aryans of Persia, like those of India, had originally a liking for minute intervals of sound, for they divided the octave into twenty-four parts.

It is through the known migrations of these races westward, and particularly into Greece, that their connection with our music is genealogically established. It is believed that, under the name Pelasgians, they settled in Asia Minor and in Greece some two thousand years before the Christian era, and their descendants or relatives, Lydians and Phrygians, afterwards mixed with other colonists, such as the Dorians, Æolians, Ionians, and Etruscans, who exercised considerable influence on their manners and customs.

The early history of Greek music is enveloped in obscurity. The Greeks had a most elaborate system of meter and rhythm, but it belonged chiefly to their poetry. The principal way in which they applied the idea of time to music was by making the duration of the sounds of unequal lengths correspond to the measures in their poetry, so that in singing, the long syllables should be sung to long notes and the short syllables to shorter notes. This was natural, but there is evidence that the idea was carried further, as signs for unequal length of notes existed in music unaccompanied by poetry, thus coming a little nearer to our modern notation. The earliest indications of a regular system of music are found in the little that is said of the poet musician Olympus, a Pelasgian by origin. He is believed to have lived during the twelfth century B. C., and is of some importance in history, as certain Greek authors and modern philologists ascribe to him the introduction into Grecian music of the so-called Enharmonic system. Others

ascribe it to the younger Olympus five hundred years later. A bas-relief in the Albani Villa at Rome shows Pan teaching Olympus to play the syrinx. It is represented in Baumann's History of Music.[1]

A great change is supposed to have been brought about among the Pelasgians by the entrance of the foreign colonists before mentioned. The influence of these people, more heroic and energetic, was to do away with the delicate estimation of sounds and to bring about arrangements in which the intervals were larger. Hence came into vogue certain musical forms which took the names of the people to whom they were due, and three of these, namely, the Dorian, Phrygian, and Lydian, took at a later date a permanent place in the Greek system, and gave corresponding varieties of character to the music, the influence of which has been perpetuated to our own day.

About a century after Terpander came Pythagoras, whose genius as a philosopher enabled him not only to effect great improvements in the capabilities of music, but to establish for the art a definite and scientific basis intelligible for all time. He was, indeed, the founder of theoretical music, for it was he who first traced the laws which govern the relations of sounds to each other, and by this means brought music within the domain of natural philosophy. He established the principle that intervals could be appreciated intellectually by the aid of numbers instead of as formerly, by the ear alone. "Sense," he said, "is an uncertain guide; numbers can not fail." Pythagoras effected this by means of the stretched strings used for the lyre. He had acuteness enough to perceive the fundamental fact that the length of the string might be made to supply an exact definition of the pitch of the note it sounded. Hence he was enabled to attach to each sound a certain numerical value, and thus to compare it with other sounds and to establish positive and definite relations between them. The instrument which Pythagoras used in these investigations was called a canon, and appears to have been similar to our monochord.

The importance of this step, connecting for the first time music and mathematics, can hardly be overrated, and as the method Pythagoras introduced has become verified and established in use by all subsequent experience and investigation, he is fairly entitled to be called the "father of musical science." Out of his investigations the Diatonic scale grew into being. Euclid (B. C. 300), about two hundred and fifty years after Pythagoras, describes the formula and gives the proportionate length of string corresponding to the various notes of the scale, a mode of determination quite conclusive.

Other elements have been added, but the Diatonic scale has remained essentially unchanged. As the series of notes was when Euclid described it, so it is now, and as it formed the basis of Greek melodies two thousand years ago, so it forms the basis of the music of the present day.

[1] Volume I, fig. 87, p. 126.

EUROPE.

PALEOLITHIC AGE.

Lartet and Christy found prehistoric whistles in the cavern of Laugerie Basse, in the Dordogne District, France. They also found whistles of the same kind in the cavern of Aurignac. It was supposed that both these caverns belonged to the Paleolithic period, and, therefore, they afforded corroborating evidence of the use of these instruments in that period. Later investigations rendered this certain with regard to Laugerie Basse, but made it uncertain with regard to Aurignac. When the first whistle was found, in 1860, in Aurignac it was reserved by these gentlemen for this confirmation, but afterwards, when, as they say, there had been many discoveries of this kind of instrument, notably those from the Laugerie Basse, so that specimens are not now rare in museums and collections, they felt themselves justified in assuming the existence and use of this instrument in Paleolithic times. Fig. 166 represents the whistle from Laugerie Basse, taken from Lartet and Christy's "Reliquiæ Aquitanicæ," and is plate V, fig. 21. It is described as the first digital phalange of the hind foot of a reindeer. A hole has been bored in its lower surface near the expanded upper articulation. On application of the lips to the hollow of this articulation, and blowing obliquely into the hole, they got a sharp sound analogous to that produced by a cat call or a key used as a whistle.

Fig. 166.

BONE WHISTLE, PHALANGE OF REINDEER. PALEOLITHIC PERIOD.

Cavern of Laugerie Basse, France.

Natural size.

Marquis de Nadaillac[1] figures a whistle of deer horn or reindeer phalange from the collection Massenat (Brives, France) similar to that shown in fig. 166, and states that others have been found in the caverns of Les Eyzies, Schussenried, and Chaffaud. He continues that they have been found in the Belgian caverns, in the peat beds of Scania, southern Sweden, in the island of Palmaria, and at other points. He says that there have been found, in the Grotto of Cottes, the radii (canon) of the reindeer and auroch treated in the same manner, and which might have been destined for the same purpose. He tells of Longperier's mention of a human bone pierced with holes at regular intervals, serving, by a strange irony of death, as a flute with which to charm the living; also of Judge Piette, who, in one of his numerous excavations, discovered a flute made of two bird bones which, joined, would make modulated tones. Similar bones were found in the collection at Rochebertier. Beyond these he knows of none. The whistles, he thinks, may have been used in war or in the chase, but he expresses

[1] Moeurs et Monuments des Peuples Prehistoriques, pp. 92, 93, No. 30.

no opinion as to the probable use of the flutes. The chief value of his report is in finding the instruments. This done, with their respective strata and associations, they speak for themselves, and the inspector or examiner is as well qualified to determine their function as is their finder. His qualification is to be determined by his experience with other or similar finds, and his ability to compare them with other instruments. It is to be remarked that, while the first series mentioned above by Marquis de Nadaillac are from caverns mostly or possibly Paleolithic, the remainder are probably Neolithic, though this would require closer examination and greater knowledge of the locality and strata of their origin than is now possessed by the author.

Furfooz is one of a number of prehistoric stations, many of which are Paleolithic, near Namur and Dinant, on the head waters of the River Meuse. They are justly celebrated by the excavations made therein by M. E. Dupont, the finds from which form a large proportion of the interesting display in the National Museum at Brussels. The greater number of these stations were caverns or shelters used by Paleolithic man. The superimposed strata in these caverns indicate with great certainty and satisfaction the chronological as well as the cultural sequence of their occupation by man. In one of these caverns, and in a stratum believed to have been formed during the occupation by Paleolithic man, was found the celebrated pottery vase, in fragments, which has been restored and is displayed in the Brussels Museum, and which has figured so extensively in the determination by prehistoric anthropologists that, while man did not make or use pottery during the Paleolithic period in France, he did in Belgium. In this station at Furfooz has been found, in what stratum I am not able to say, nor even do I know positively in which cavern, but quoted from the Annals of the Société Archæologique of Namur[1] as having been found "*dans les bains voisins de la forteresse*," a whistle of white clay, (*en terre blanche*) (fig. 167), in the form of a bird, the mouthpiece of which was in the tail and the venthole in the belly, as seen in the figure. Another whistle, said to have been found in the phosphate beds at Mesvin near Mons, Belgium, and claimed to have been paleolithic, is in the possession of M. Leon Somzée of Brussels.

Fig. 167.

TERRA-COTTA WHISTLE, BIRD-SHAPED. BRONZE AGE.

Near cavern of Furfooz, southern Belgium.

The question will immediately arise whether these were really musical instruments. It has been suggested that they were for calls or signals and may have been used, as the boatswain does his whistle, to direct the movements of men at a distance. This would not be music, and if they were always thus used they would not be musical instruments; but if, on the other hand, they were used to give a rhythmical cadence

[1] Volume XIX, 1892, p. 360.

to a dance or song, or for any similar purpose, they would be musical instruments. Any attempt to decide to which use these objects were put and so decide whether they were or were not musical instruments would be mere speculation. That they might have been used as such, and that hundreds of other similar instruments have been found which were used as musical instruments, justifies this classification and their insertion in this paper.

The Grotto or Cavern of Gourdan, in Haute Garonne, France, was explored by Judge E. Piette. The work of exploration lasted for three years (1871–1874), and was conducted by a Frenchman whom I met there who served as cook at Delmonico's for four years (1861–1864), and who, having thus made his fortune, returned to Gourdan and established himself as innkeeper. He did the work of excavation under pay from Judge Piette, and it occupied him for three years. This was another of the caverns in which the superimposed strata evidenced the chronological and cultural sequence between the Paleolithic and Neolithic occupations. In a stratum of the later period, amid much charcoal and cinders, he found a bone flute or pipe pierced with holes and capable of producing three notes.

A memoir appeared in the report of the Société Académique des Sciences, etc., of St. Quentin, France, for the year 1873–74, XII, 3d ser., p. 339, written M. Textor de Ravisi, wherein he argued as to the existence of musical instruments in the age of stone, and, maintaining the affirmative, he cites the invention of M. Baudre, who had made what he called a "Clavier de silex," that is to say, a sort of piano or xenophone, composed of twenty-eight stones, twenty-six of flint and two of schist. They were arranged according to note and sound, whether made so by size or shape is immaterial, and were struck with a pebble, producing the melody. The inventor chose natural pieces of flint, and did not chip them to size or form. He insisted that the natural pieces produced infinitely better tones than those which were chipped. While this instrument was entirely possible in Paleolithic times, yet there is nothing to show that it was ever invented or used. Indeed, there is nothing in all the discoveries that have ever been made to show that Paleolithic man had any system of music applicable to this instrument, or that he would have recognized it or the music if either had been presented before him. There is an instrument similar to this in the Museum of Science and Art at Dublin, but the stones are all of schist and none of flint. These are no evidence of prehistoric musical instruments, and are only ingenious modern inventions by which our present scales of music are brought into use.

NEOLITHIC AND BRONZE AGES.

M. Fétis[1] gives an illustration of a pipe from a prehistoric grave of the Neolithic period near Poitiers, and of which a cast was fur-

[1] Histoire Generale de la Musique.

nished him by M. Lartet. It was rudely constructed from a stag horn, was blown at the end like a flageolet, and had three finger holes equidistant.

SCANDINAVIA.

Luhrs.—The most elaborate, as well as the most beautiful instruments of music belonging to prehistoric times, were the bronze and gold trumpets or horns of Scandinavia. They are not toys, but are of large size, quite as large as any horns of modern times, being sometimes 5 and even up to 8 feet in length, with bell mouths 6, 8, and 10 inches in diameter. No particular style was adopted, though all specimens agree in the requisites of the horn or trumpet. Some are straight and some curved, after the fashion of the modern horn; others, again, are curved at one, and still others at both ends. The majority of these instruments are of bronze, cast in short sections with joints or shoulders, which, being fitted, are riveted together. The straighter ones are in longer sections and, consequently, with fewer shoulders, while those more curved have proportionately shorter sections and more shoulders. The variations of form and consequent changes in manufacture will be apparent on inspection of the figures.

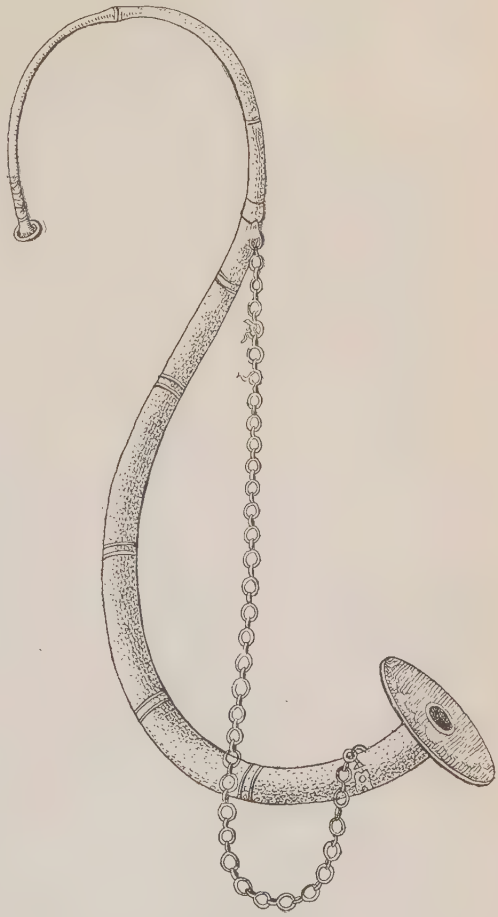


Fig. 168.
BRONZE HORN, MOLDED.
Length, 8 feet.
Maltbeck, Denmark.
One of twenty-three in Copenhagen Museum.

These horns are called luhrs by the Danes. They are from southern Sweden and Denmark as far south as Sleswick, but not farther. They are found mostly in peat bogs. Whether this was an intentional deposit and for the purpose of their preservation has never been determined.

Fig. 168 represents one of these large horns curved at both ends, in

the shape of the letter S, found at Maltbeck. It is nearly 8 feet in length, measuring the convex sides. It had been cast in sections, which have been fitted and riveted. It has a disk upon the larger end (similar to fig. 187 from Ireland), the decoration on which is a representation of the daisy flower. The small end was provided with its mouthpiece, which is rather uncommon, and, as will be seen shortly, it was capable of being played upon. The details of this instrument, mouthpiece, disk at bell mouth, chain, ring, and strap, are shown in accompanying figs. 169 *a*, *b*, *c*, *d*. This specimen is reported in the guidebooks of the Museum of Antiquities at Copenhagen as belonging to the fourth hall or room containing objects of the Bronze age, as No. 74, with the following label:

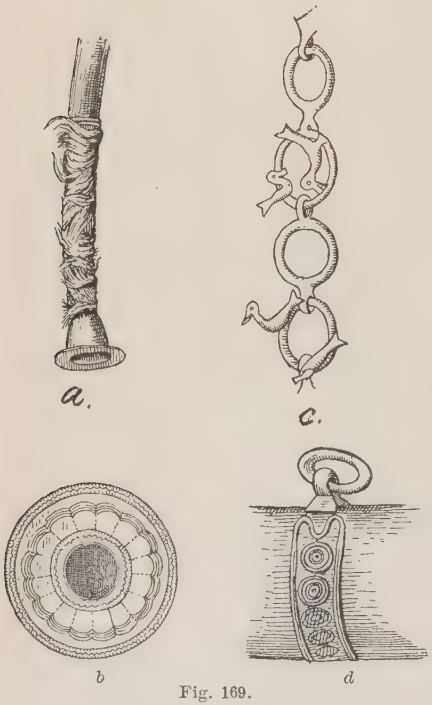


Fig. 169.

DETAILS OF FIG. 168.

(*a*) mouthpiece; (*b*) disk at bell mouth; (*c*) chain for suspension; (*d*) strap and swivel for chain.

> Twenty-three (23) trumpets of war (luhrs) composed of sundry pieces of bronze molded separately; found in the peat bogs, ordinarily in pairs.

This instrument has attracted the attention, both of the archæological and musical world, and sundry reproductions of it have been made—one is in the British museum, one in the Museum of Natural History, New York city, and one in the Musée Instrumental of the Royal Conservatory at Brussels (see No. 1156 of its catalogue), the latter giving the scale, from E-flat in the bass clef to E-flat on the upper space in the treble clef.

A notice of a concert by the instruments in the Copenhagen Museum was published in the Washington Evening Star, February 6, 1896, from the San Francisco Chronicle, which is here inserted:

> An enormous crowd fills the museum and neighboring square at Copenhagen every midsummer day to listen to a unique concert. A number of ancient Scandinavian horns more than three thousand years old, called "luren," are kept in the museum. Of this collection fourteen are in good condition. They have an elegant shape, and the flat metal plates at the mouthpiece show good technical perfection and a developed taste for art. They are in different pieces fitted together. They are of very thin metal, and generally 7 feet long. A few years ago it was found out by Dr. Hammerich that they could still be blown or played upon. Their tones resemble those of the tenor horn, and they have a soft but powerful sound. Some are tuned in C and E sharp and others in D, E, or G, and these tones form an accord, but no

"scala." On the balcony in the court of the palace in which is kept the Northern Museum two members of the "capella" blow tunes on two of these primeval horns to the delight of the inhabitants.

Professor Starr says of one of these concerts:

> We had the good fortune to be present. The court of the museum was filled with hearers. Wonderful, is it not, that horns two thousand years old, buried for long centuries in peat bogs, should, after this long silence, still be capable of giving out clear, ringing, even sweet, tones.[1]

The age of bronze is supposed to have begun in Scandinavia about 1500 B. C. It has been divided, for convenience of description, into the first and second periods, corresponding in some degree with the same ages in continental Europe, especially France, to which M. de Mortillet has given the names (1) Morgien and (2) Halstattien. These subdivisions have been made principally from the inspection of the objects themselves, their development, and their associations. It is believed by those who have studied the subject with the greatest attention and the most in detail that whencesoever the bronze may have come and howsoever the knowledge to work it came, that most of the objects found in Scandinavia were made in the country; consequently, are of a culture and art indigenous thereto, and that this applies to both periods. Nearly all bronze objects were made by casting. It is not until near the close of the age of bronze that evidences of hammering as a method of manufacture have been found. Hammering and drilling were employed after the object had been cast, and for the purpose of putting it together. Many molds in which objects were cast have been found throughout the country, but, so far as known to the author, none which were used for casting these trumpets or horns. A moment's consideration will make apparent the difficulty in casting. Their length, the size of the piece, the thinness of wall, the extent of core, together with the exactness required to make the sonorous quality, not only so that they shall sound, but that they shall make a note within a given scale—a consideration of these difficulties, and the ability displayed by their makers in overcoming them, should increase largely our appreciation of the capacity of the workmen. One of the most beautiful specimens of bronze vases of elegant form and choice decoration was found in the Island of Funen with the core of clay still in it, thus enabling its discoverers to determine with certainty the method of its manufacture. The casting had failed in part and was never completed. The many other similar vases which were successfully made is proof of the capability of the workman. No evidences of the art of soldering during the bronze age have been found in Scandinavia. Not only have no soldered specimens been found, but many objects were repaired without solder. Two methods were employed, riveting, or by the apparently more difficult process, described elsewhere, of pouring molten metal on the junction of the broken pieces

[1] Popular Science Monthly, LXVII, p. 22, May, 1895.

until they themselves have become melted and the new and old were fused and formed a solid mass.

Thus much for the Bronze age; but this does not account for all the prehistoric objects in bronze belonging to that country. The prehistoric ages of iron have been divided into three epochs, covering a period from some time anterior to the Christian era until about 1000 A. D., when the historic period as represented in the known languages of Europe began. The languages used in Scandinavia prior to this time were Runic. They were protohistoric but afterwards passed out of use. The term "iron age," while it denotes the use of iron, was principally applied to its use for cutting implements. Bronze did not cease to be used for many purposes, and among the rest, for the luhrs or trumpets or horns. Therefore many of these instruments of bronze have been found which belonged to the prehistoric ages of iron. The question of chronology can only be determined by critical examinations of almost infinitesimal details in the manufacture, form, kind, and use of implements, and of the objects associated with them, and even then errors are not infrequent. This should be borne in mind in criticising the assignment of any given instrument to a certain age or period.

In the last age of iron, when the runes had passed their final stage of improvement and are capable of being read, we gain much information therefrom concerning the life history of the people, and find they made war, indulged in the chase, and played games, as other people did then and have ever done. A social custom which prevailed among the Scandinavians, peculiar to them and to the Celts, and possibly other peoples, was that of minstrelsy, whereby the instruments of music were brought into use. Mr. Montelius[1] says:

> Of musical instruments, we read of the lyre, the horn, the pipe, the fiddle, and above all the harp, one of the oldest and most prized. Snorri relates of Olaf Skötkonung, that when the meats were set upon the king's table, the players stepped forth with "harps, fiddles, and other instruments." To the tones of the harp the skalds generally sang their songs. Skalds often visited at the court of the Swedish kings; sometimes they came from Iceland.

Of these, the horn only seems to have been prehistoric, and it alone has received attention in this paper.

In 1801 eight of these large curved bronze horns were found in a peat bog or turf bed, Brudevælte, in a field near Liunge in the neighborhood of Fredericksborg. These were intact and complete, mouthpiece and all, are in the museum at Copenhagen, and have lately been played upon, as previously related. The longest was 6 feet and some inches, while the largest disk on the bell mouth was 11 inches in diameter.

Fragments of bronze horns had before been found throughout that

[1] La Suede Prehistorique, p. 115; and Civilization of Sweden in Prehistoric Times, p. 177.

country and gave rise to much speculation as to their possible origin and use. The discovery of these complete horns identified the objects and solved the doubts.

Another bronze horn in the museum of Copenhagen, 5 feet in length, was discovered in a peat bog at Wedellsborg, Island of Funen, in the year 1809. It had a chain attached.

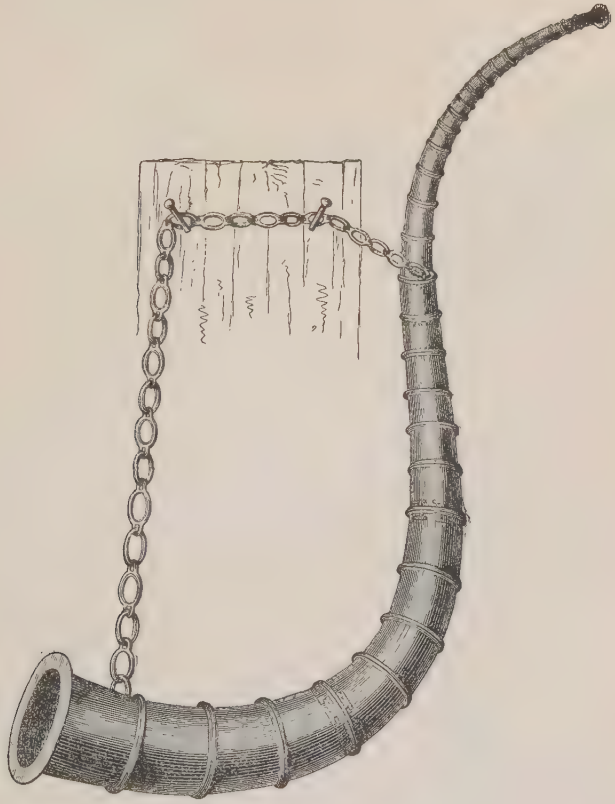


Fig. 170.

BRONZE HORN. SECOND AGE OF BRONZE.

Length, 3 feet 4 inches.

In Archæologic Museum of Lund, Scania, Sweden.

Fragments of a bronze horn have been found in a bog near Lummelöv, Island of Falster. There are now twenty-three bronze horns in the museum in Copenhagen.

Fig. 170 represents a war (?) trumpet of bronze, cast in sections, fitted and riveted as before described. It is said to belong to the second age of bronze. It was found 8 feet beneath the surface in a peat bog near the city of Lund, Scania, Sweden, and is in the Archæological Museum of the university of that city (No. 4372). Its length is 40 inches. It was in perfect order and is yet capable of giving its

proper sound. The figure is taken from Antiquities Suedoises[1] by Montelius.

Fig. 171 represents a horn belonging to the Iron age (prehistoric), found in a peat bog in Södermanland, Sweden. The middle portion is an ox horn of which only enough remains to show what material it was. The mountings are elaborate and are attached at either end in such way as to lengthen the horn and increase its power as a musical instrument. The two mountings are attached by a bronze chain with long links, which has served for suspension or carrying. It is taken from Montelius.[2] The small ends of many of these horns were destroyed when found, and so it is undeterminable whether they were used for music or for drinking. Horns similar in all appearance to these were in that country and in that epoch used for both purposes.

Fig. 171.
OX HORN WITH BRONZE MOUNTINGS, FOR MUSIC OR DRINKING, OR BOTH.
Södermanland, Sweden.
¼ natural size.

Fig. 172 represents a horn, probably of the Iron age, with bronze mountings. It may have served for music or for drinking. It was arranged with a long linked chain. It, with two others, was found in a burial tumulus at Sojvide in Gotland, in a stone cist, with about five hundred bronze beads, two pottery vases, belonging to a single skeleton. The specimens are in the National Museum in Stockholm, Sweden.

Fig. 173 represents a bronze war trumpet taken from Worsaae.[3] It is

[1] Volume I, p. 53, fig. 178. [2] Ancient Swedish Civilization, p. 107, fig. 115.
[3] La Colonisation de la Russie et de Nord Scandinave, p. 72.

without description as to size, time, or place of finding, or present deposit. It is given because of a different form from any heretofore shown.

Gold horns.—The chefs d'œuvre of prehistoric horns were the magnificent ones found, respectively, in 1639 and 1734, in the little village of

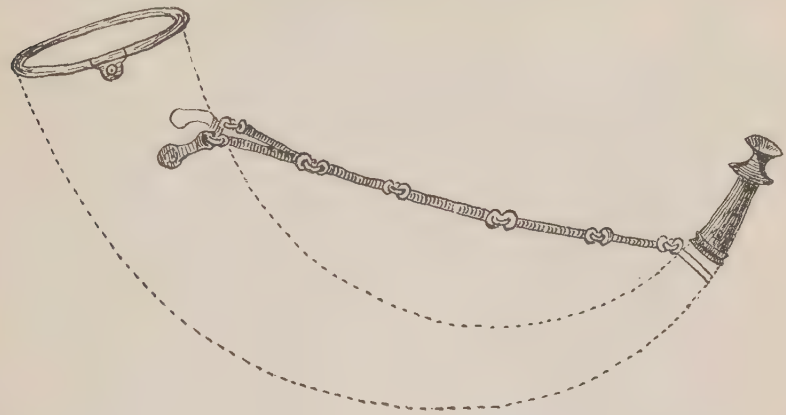


Fig. 172.

OX HORN WITH BRONZE MOUNTINGS, FOR EITHER MUSIC OR DRINKING.

Gotland, Sweden.

Montelius, Antiquites Suedoises, II, p. 114, fig. 381*a*. ⅓ natural size.

Gallehuus, on the western coast and in the Duchy of Sleswick, near the boundary between Denmark and Germany. These instruments are, or were, so beautiful and valuable, and their history so well authenticated, as to justify their description.

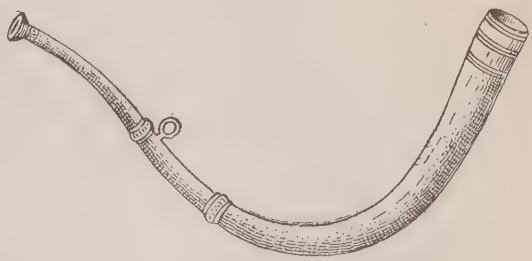


Fig. 173.

BRONZE HORN FROM SCANDINAVIA.

Worsaæ.

On July 20, 1639, a young girl of poor family named Kristine Svendatter (daughter of Svenon) left her house to go to the little village of Tonder. Walking in her bare feet, she stubbed her toe against what she thought to be a root. She struck it a blow with her staff, gave an imprecation upon it, and passed on. Some days afterwards fate or luck caused her to pass the same way, and she struck her toe against the same object, which excited her indignation if not her wrath, and she determined to cut down or dig up the root which lay in the path of travelers and which on these two occasions had served her such a trick. She dug it out and found it to be this horn (fig. 174). Certain neighbors gave her their opinion that it was a huntsman's old tin

horn and not worth carrying home; but she decided to the contrary and carried it with her, with no idea of what it really was. Arrived at home, she washed it and concluded it to be of tin or copper, still of no value. There were certain rings upon it which she gave the children to play with. After some days she went to the market town and took with her one of these rings to be examined, when it was discovered that the ring was not only gold, but unusually fine gold. The King of Denmark, Christian IV, was then at Gluckstadt with his son, Prince Christian. The golden horn was brought to him, he made recompense to the girl, and presented the horn to his son, the prince. He had at first the idea to have the piece melted and made into a new-fashioned cup, but better counsels prevailed, and a goldsmith was employed to clean and put it in good shape, which he did. It had neither cork nor mouthpiece, so no one was able to say whether it had been used as a music or a drinking horn. The gold worker settled the question for the moment by preparing a cork with gold trimmings, and the horn was ever afterwards used as a drinking cup on state occasions. Its capacity was 5 pints.

Fig. 174.

GOLDEN HORN, MOLDED IN BANDS, SOLDERED AND CRIMPED.

Length, 34 inches; weight, 6 pounds 6½ ounces. Found in 1639 at Gallehuus, Denmark.

About one hundred years thereafter, April 21, 1734, a poor peasant named Lassen, or Laritzen, of the same village of Gallehuus, was digging for clay in the field about 25 paces from his cabin, when his pick struck an object which shone with great splendor. On digging it out it was found to be the gold horn indicated (fig. 175). Almost a hundred years had passed since Kristine Svensdatter had stubbed her toe against the first one and, naturally, there was difficulty in identifying the exact spot, but according to tradition, the second was found 3½ paces to the southwest of the first. The horn was cared for by a goldsmith in Tonder, determined to be fine gold, and then placed in the possession of Count Otto Diderick Schack, proprietor of the domain. It

was transmitted to King Christian VI, who gave to the peasant 200 rigsdalers.

Description of the horn found in 1639 (fig. 174): Its length was 34 inches; at the bell mouth its circumference was 12½ inches, and the diameter 4¼ inches; at the small end, which, however, had no mouthpiece, its circumference was 4⅛ inches, and its diameter 1½ inches. Its weight was 6 pounds 6½ ounces. Its manufacture was complicated, somewhat difficult to describe in detail, and, perhaps, unimportant from the view point of a musical instrument. It was made of thick sheet gold; whether hammered or cast does not appear. It was double throughout, one sheet forming the interior, which was solid, smooth, and polished; whether made in a single sheet or by a succession of sheets soldered together is not now known. The interior sheet of gold was less pure than the exterior. The exterior plate was made in bands or sections, as shown by fig. 176, thirteen regular ones and a small one at the bell mouth. These bands graduated in size and length from the large to the small end of the horn. The six smallest bands were

Fig. 175.

GOLDEN HORN, FRAGMENT.

Weight, 7 pounds 5½ ounces. Found 1734 at Gallehuus, Denmark.

soldered to the interior sheet so as to form a solid piece. The other seven bands were different. While the bands at the smaller end may have been made separate and afterwards soldered together, the junction being covered by the solid ring, as shown in the figure, it is certain that the seven larger bands were made separate, for they were not soldered together, but inserted one into the other continuously after the fashion of a stovepipe, the junction being crimped so as to prevent their separation, yet permitting them to be rotated one upon the other. These junctions were then covered by separate gold rings, as shown in the figure, each ring fitting to its particular place. These seven larger bands were covered with figures, some of which were cast and soldered on, while others were made by punch marks (*pointillé*). The character and different kinds of these designs are not to be described, yet will be apparent on inspection of fig. 176, showing details.

Description of horn found in 1734 (fig. 175): This horn was broken and probably half of it (that of the smaller end) was not found. It was heavier and larger than the first one (fig. 174). It was made in

the same general method with a smooth interior surface and exterior bands, all of which were soldered together. There were only five exterior bands in the fragment. The weight was, nevertheless, 7 pounds 5½ ounces—15 ounces more than the first one, although that was complete. The ornaments (fig. 177) were, like that of the first, some cast and soldered on, while others were made with punch marks—*pointillé*.

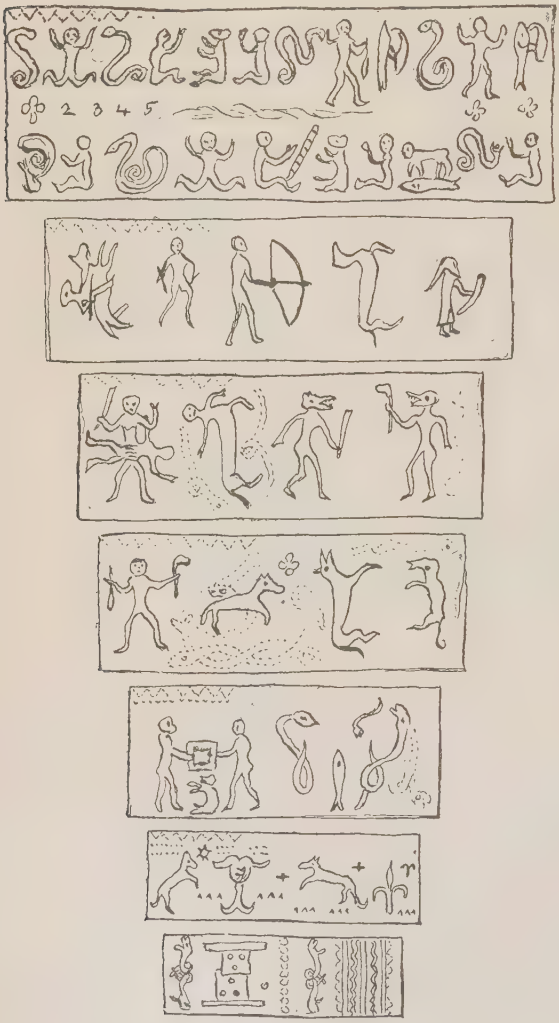


FIG. 176.

DETAILS OF FIRST GOLDEN HORN (fig. 174): SEVEN BANDS MOLDED AND CRIMPED, WITH SOME ORNAMENTS MOLDED AND SOLDERED ON, OTHERS PUNCHED.

The designs upon the two horns, respectively, are from their form, manner of making, and mechanical work generally, evidence that they both belonged practically to the same epoch. The ornaments (fig. 177) upon the horn (fig. 175) (1734) were artistically inferior to the other. There have been, of course, many attempts on the part of antiquarians to decipher or translate these figures and discover the date of the making of the horns. These efforts have resulted in many theories, with none of which we are particularly interested. They were supposed to be calendars of antiquity, to represent the signs of the zodiac, to be a map of the heavens and so deal with astronomy, to have related to the worship, first of the sun and then all within the range of Scandinavian mythology, as well as other mythologies. The antiquarians who made the most profound studies of these horns, and whose description and opinions are best entitled to consideration, were (1) Mr. E. P.

Muller[1] and (2) Kanut Henneberg.[2] The first gentleman concludes that both horns were the work of one and the same people, that none of the figures had any relation to Scandinavian mythology, but have a greater relationship with the Mongols, perhaps had been brought from Siberia,

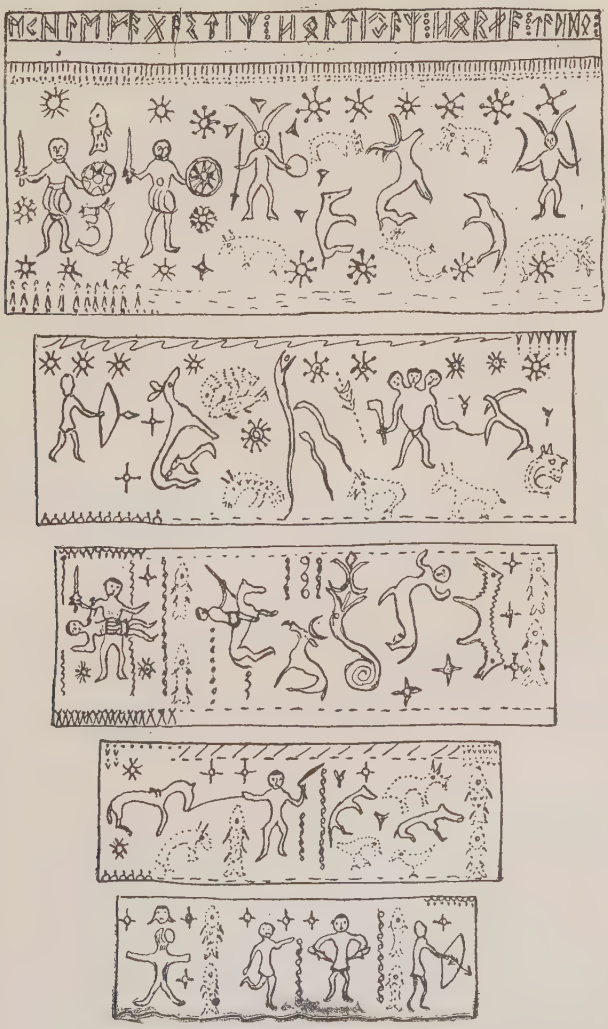


Fig. 77.

DETAILS OF SECOND GOLDEN HORN, FIVE BANDS (fig. 175).

[1] "Antiquarisk Undersögelse over de ved Gallehuus fundne Guld-horn (an archæologic examination of the gold horns found near Gallehuus). Copenhagen, 1806 quarto, with designs of the two horns engraved by G. L. Lahde."

[2] "Hvad er Edda? eller Raisonneret kritisk Undersögelse over de tvende ved Gallehuus fundne Guld-horn. (What is this but the Edda; or a critical examination and argument as to the two horns disinterred near Gallehuus.) Aaborg, 1812, quarto, with designs engraved by J. Flint."

and had probably served as ornaments in the temple of Jomale in Burmah, a suggestion derived from certain Sagas of Herraud and de Bose. He interprets the Runic inscription as Celt-Iberian, and perhaps Druidic.

The second gentleman attributes these golden horns to a different origin. He thinks he recognizes the gold of which they are made as from Hungary, Transylvania, or perhaps the Crimea. The figures upon them suggest to him the usage of the Vandals who combined the worship of Odin, Thor, and Friga, with that of their national gods. It is agreed by both these gentlemen that the figures denote a barbarous epoch so far in the past that, if they have any meaning at all, it is now inexplicable beyond theory or suggestion.

The last found horn (that of 1734), fig. 175, had a Runic inscription in the narrow band at its bell mouth. This inscription has been read, reread, and guessed at, until it has received every kind of rendition. The results of the principal attempts in this direction have been given in extenso by Mr. C. C. Rafn.[1]

W. F. Kopf, 1821, writes: "I am (both) a horn of the chase (huntsman's horn) and a drinking cup (dedicated) to the orgie (ceremony) of Holte."

According to Gisle Brynjulfsson, 1823: "I, Hlevus, have made these two horns," or "Thorfin and Leif have made both these horns."

Fin Magnusen, 1834, says: "I bring to the sacrifice the envelope of the horn of Tovid."

N. M. Petersen, 1837, gives: "I, Hlevo, have made the envelope of this horn."

According to Jacob H. Bredsdorff, 1838: "I, Hleva, have made these horns for my guests, the inhabitants of the forest (the Holsteinois)."

Jacob Grimm, 1848, writes: "Holsatis, intimis hospitibus pocula dedi."

K. Mullenhoff, 1852, says: "I have made these horns for the Holzingen, or guardians of the forest."

C. C. Rafn himself makes the following literal rendition:

ECHLEV OG OSTIR HULTInGOR
HURNO TVO VIgI U

which he translates into Danish as follows:

Echlev ak Astir (Eyleife ok Astyr) Hyltingar tva (tvo) vigpu, which in English is "The Holsteinois, Echlev and Astyr, have initiated (or consecrated) these two horns." According to his examination of history as set forth in certain of the Sagas, Mr. Rafn concludes that Eglaf or Eyleif was a chief of the southern Danes in Holstein about the fifth century.

Both golden horns were deposited in the Royal Cabinet of Curious Objects. A thief, by the aid of false keys, broke into the cabinet May

[1] Atlas of the Archæology of the North, published by the Royal Society, Copenhagen, 1860.

4, 1802, and stole both horns. To avoid detection, he melted them into bars, and, being a goldsmith, he fabricated therewith chains, collars, buckles, and other jewelry. This further excited his avarice, and he began the falsification or adulteration of the gold in his manufactured objects, which led to his detection and final conviction.

The foregoing descriptions were from measurements, drawings, and casts made while the horns were in existence.

IRELAND.

Bronze horns.—The ancient musical instruments of Ireland, so far brought to the notice of archæologists, are the horn or trumpet, the harp, and the bagpipe. The two latter are more modern and are probably not prehistoric. The Museum of Science and Art at Dublin possesses several ancient harps, attractive on account of their historic and national interest, but they are not for us. The only prehistoric objects found suspected of belonging to this class are the bone hairpins (?) from the Strokestown Crannoge.

Fig. 178 shows a metacarpal bone of a deer. It is 8 inches long, is hollowed artificially throughout and perforated with nine holes, each of which is surrounded by a circular incised line, the upper hole with two

Fig. 178.

BONE FLAGEOLET (?), FRAGMENT, METACARPEL OF DEER.

Museum of Science and Art, Dublin.

lines. It is otherwise decorated with dots and lines. Sir William R. Wilde[1] was doubtful about this being a musical instrument. He says:

> If it was the top member of a lute or a small rude harp, the holes might have been used for holding the pins to which the strings were fastened.

It is here figured as possibly a musical instrument.

M. Paul du Chaillu wrote his interesting work, "The Viking Age,"[2] to demonstrate the proposition that the early settlers of Britain and the British Isles were Vikings rather than Anglo-Saxons. He based his theory upon the similarity of the many objects found, respectively, in Britain and Denmark. While his theory has not been accepted generally, yet it must be confessed that the similarity he points out was remarkable. Not the least is it so with regard to the trumpets or horns (luhrs). A fact in this similarity opposed to Du Chaillu's theory is that the greater, almost the entire, number of these trumpets are found in Ireland, while they are extremely rare in England. Sir John Evans[3] records that as early as 1713 Mr. F. Nevill described[4] eight bronze trumpets found at Dunganon, County Tyrone, Ireland.

[1] Catalogue of Antiquities of the Royal Irish Academy, p. 344, fig. 225.

[2] Two volumes, pp. xix, 591, and viii, 562; fig. 1364.

[3] Ancient Bronze Implements of Great Britain and Ireland, p. 358.

[4] Phil. Trans., XXVIII, p. 270.

Sir W. R. Wilde[1] reports that the earliest historic notice of the discovery of these instruments was by Sir Thomas Molyneaux in his "Discourse Concerning the Danish Mounds, Forts, and Towers of Ireland," 1725. This author bases his opinion upon the work of Olaus Wormius's treatise of the antiquities of Denmark (1655), in which everything of high antiquity found in Ireland was accredited to the Danes. This was carried to such excess as to include many things exclusively Irish, and of which nothing like them were ever found in Denmark. These authors were followed in some degree by Du Chaillu.

In 1750 thirteen or fourteen of these curved bronze horns were discovered near Cork. Three of them were figured by Charles Smith in his "History of the County of Cork," and are believed to be the same sold to Bishop Pocock and figured by the Society of Antiquaries in "Vestuta Monumenta," and afterwards copied in the "Historical Memoirs of the Irish Bards," 1786.

Three trumpets and a fragment of straight tube were discovered in the County of Limerick in 1787, and figured in Volume II of its Transactions. In 1794 four bronze trumpets were found in a bog on the borders of Loch Nashade, near Armagh. In 1809 two joints of a large and perfect curved bronze trumpet were found in a peat bog at Ardbrin, County Down. In 1833 Dr. Petrie[2] described and figured a cast bronze horn, one of several found at Dowris and then in possession of the Dean of St. Patrick, one of which is here represented as fig. 181. In 1835 several trumpets were discovered in a bog near Killarney. The largest measured 15 inches and the smallest 10½ inches from point to point. They were distributed among various antiquarians in Cork. In 1847 three trumpets were discovered near Cloghoughter Castle, County Cavan. In 1840 four trumpets were discovered in the bog of Drumbest, County Antrim.

The Royal Irish Academy, recently consolidated with the Kensington Museum under the denomination of the Museum of Science and Art, Dublin, possesses sixteen specimens of these bronze trumpets. Sir W. R. Wilde[3] divides them into two classes—(1) those of which the small end is stopped and the mouth hole is in the side, flute fashion, and (2) those with the small end open and the mouthpiece inserted trumpet or horn fashion. On none of the specimens was any mouthpiece found, but the appearance when found and subsequent examination satisfies the student of its existence and use. Of those blown from the ends, some were cast and some hammered and riveted. Those closed at the end and with mouth hole on the side were all cast. From these differences he makes five varieties of prehistoric bronze trumpets in Ireland.

The cast specimens were in one piece, having been molded com-

[1] Catalogue of Antiquities of the Royal Irish Academy, I, p. 623.

[2] Dublin Penny Journal, II.

[3] Catalogue of Antiquities of the Royal Irish Academy, I, pp. 626, 627.

plete in a single operation, the work of cleaning, drilling, and decorating having, as in modern times, been done subsequently.

The other specimens were of thin sheet bronze, originally cast, for bronze can be made only by casting. How thin the bronze originally was when cast we have no knowledge, but whatever its thickness it must have been hammered, probably many times, being annealed each time to prepare it. Reduced to the proper thickness by whatever process, it was bent by hammering, probably repoussé, into the proper form, usually, if not always, in two pieces. The edges, being brought together, are fastened by any of the various methods of riveting. Fig. 190 is a representation of the details of the operation of riveting as employed in fig. 189. Sometimes the strips of thin bronze were laid on the outside as well as inside and the rivets put through three instead of two thicknesses. This was the case with fig. 187. While these workmen must have had knowledge of the art of soldering (shown in their gold work by the attachment of collars, rings, etc.), yet none of these instruments are reported as having been thus made.

Several of these instruments had been broken in ancient times and mended by the prehistoric workman. The methods of doing this show that in prehistoric times, as well as early Christian times, the metal workers of Ireland were of a high order and possessed of a degree of skill greater, probably, than any in Europe at the same period. The display in the Museum of Science and Art in Dublin of gold, silver, and bronze work, dating earlier than the eleventh century, will demonstrate the truth of this proposition. Reproductions in baser metal made by Mr. Edward Johnson, an antiquarian jeweler of Dublin, were displayed in the British section at the Chicago Exposition and were admired by all who had the good fortune to see them.

The instruments cast in molds were mended by a process called "burning," i. e., pouring molten metal on the junction of the broken pieces until they were themselves melted, when the old and the new metal would be fused into a solid mass and the break repaired. Occasionally this produced an enlargement, as in the case of fig. 183. In other specimens the ends or edges of the broken pieces were brought together and brazed. This was the usual course when mending broken bronze swords or daggers. Yet many times these swords, with other broken objects, were sent to the foundry for recasting. Fourteen thousand broken pieces of this or similar kinds were found together, forming part of the great prehistoric bronze foundry in Bologna, Italy. Where the bronze had been hammered, the process of reparation was by dovetailing or by riveting, and sometimes both. Fig. 190 represents the details of one of these processes.

Fig. 179 represents a curved bronze trumpet molded and cast, found at Portglenone, County Derry. It measures 24½ inches on its outside curve. It has the end stopped and a mouth hole in the side, flute fashion, as shown in the drawing.[1]

[1] Sir John Evans, Ancient Bronze Implements, p. 361, fig. 444.

Fig. 180 represents another bronze trumpet molded entire with closed end and lateral mouth hole, flute fashion. It is from Tralee, county Kerry, and was described by Mr. Robert Day.[1] It, like fig. 183, has been broken across the mouth hole and repaired by pouring hot metal around the fracture until it was melted and united. The mouth

Fig. 179.

BRONZE HORN.

County Derry, Ireland.

$\frac{1}{2}$ natural size.

hole is on the concave portion, while in the other two (figs. 179 and 183) the mouth holes are on the side—that is, midway between concave and convex.

Fig. 181 represents a bronze horn with rows of spikes at either end, but otherwise without decoration. The ends are open, but the mouthpiece is gone. This instrument was molded and cast, and the imperfect adjustment of the molds has produced ridges, extending from one end to the other, on the convex and concave sides. It has been broken and mended in ancient times by the process of "burning in," elsewhere

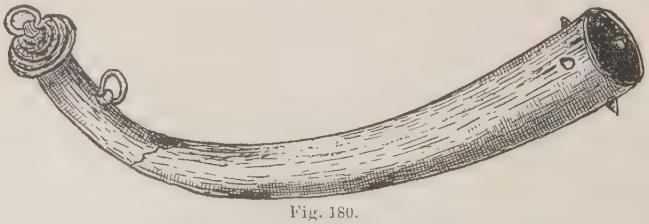


Fig. 180.

BRONZE HORN, BROKEN AT THE MOUTH HOLE AND REPAIRED.

Tralee, County Kerry, Ireland.

described. It was part of the "Dowris find," is 24 inches long on the convex side, $2\frac{1}{2}$ inches in greatest diameter with circular termination at small end.

Sir John Evans[2] reports a bronze trumpet, cast, belonging to the

[1] Journal of the Royal Historical and Archæological Association of Ireland, 4th ser., III, p. 422.

[2] Ancient Bronze Implements, p. 360.

"Dowris find," as broken and mended in ancient times, the operation having been performed in a manner similar to that represented by fig. 184.

Some of the instruments from the "Dowris find" are in the British Museum.[1] They have a peculiar golden luster, attributed to the presence of lead. An analysis by Donovon[2] gave:

Copper	79.34
Tin	10.87
Lead	9.11
	99.32

Fig. 181.

BRONZE HORN, CAST.

Length, 24 inches.

Museum of Science and Art, Dublin. Sir Wm. R. Wilde, Catalogue of Antiquities, Royal Irish Academy, I, pp. 627,628, fig. 11.

Fig. 182 represents a bronze trumpet, molded and cast in a single piece, of dark metal and strengthened at both concave and convex sides by projecting ridges, which emphasize those left by the molds. It is 22½ inches on the convex side, is 2½ inches at the large, and ⅞ inch at the small, end. It is open at the small end with a projecting dowel tube to receive the mouthpiece, which is, however, lost, as is the case with all these instruments. There is a small, solid, ring loop as though for chain or cord for suspension. It was found near Cloghoughter Castle, County Cavan, associated with two others. Still another of the same shape, but slightly larger, was found at Roscrea.

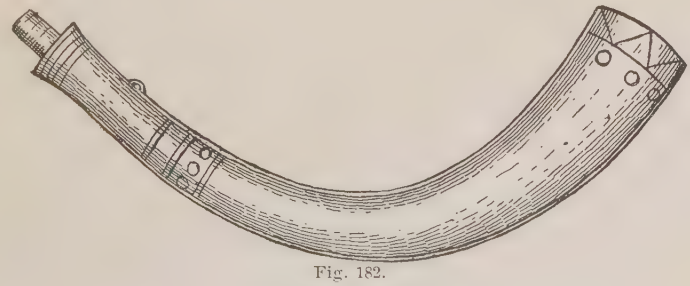


Fig. 182.

BRONZE HORN.

Length, 22⅛ inches.

Museum of Science and Art, Dublin. Wilde, Catalogue of Antiquities, Royal Irish Academy, fig. 530, No. 6, p. 629.

Fig. 183 represents a trumpet which Sir W. R. Wilde[3] says is one of the finest specimens yet discovered. It was molded, cast, and is of bright yellow bronze, preserved thus doubtless in the peat; is 34½ inches in length on the outside and 3½ inches in its greatest diameter. The small end is closed and decorated with a molded head 2⅝ inches in diameter, finishing with a ring and eye. There is another ring

[1] Archæological Journal, XII, p. 96.

[2] Von Bibra, Die Bronzen und Kupferlegirungen, p. 140.

[3] Catalogue of Antiquities of the Royal Irish Academy, p. 629.

attached to the body of the instrument on the concave side and near the small end as though for a chain. The mouth hole is in the side or body of the instrument, flute fashion. Fig. 184 represents in detail the smaller end, showing that it has been broken across the mouth hole and how it was ingeniously mended by pouring hot metal around the fracture until the edges were melted and joined.

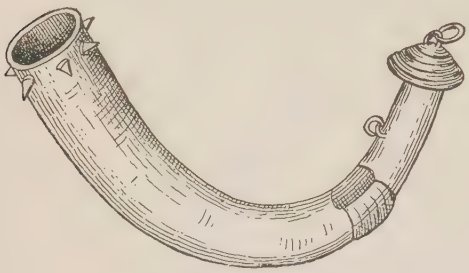


Fig. 183.

BRONZE HORN.

Derrymane, County Kerry, Ireland.

Museum of Science and Art, Dublin. Wilde, Catalogue of Antiquities, Royal Irish Academy, pp. 627–629.

Figs. 185 and 186 represent two trumpets of sheet bronze, hammered and not cast, from Tralee. The mouthpieces are, as usual, gone, and while it is not exactly known how the instruments were blown, it was not as a flute and, therefore, must have been as a horn or trumpet. There are rivet holes on the bell mouths of two of these horns, showing them to have been provided with flanges similar to fig. 187. Two of them have four protruding spikes near the bell mouth, which Mr. Day suggests may have been to add effect to blows in case the trumpets should be used as weapons, but this theory can scarcely be maintained, because (1) these instruments are not strong enough to withstand the crash of an effective blow, (2) the spikes are in the middle and on the small, (fig. 186) as well as on the larger end, and (3) they are on the straight tubes (fig. 191) of thin sheet bronze, so small as to be ineffective for any such purpose. Fig. 186 is peculiar in that while the outer end of the horn is curved, the near or small end is straight. It is made with two pieces fitted together, sliding one in the other after the fashion of a jointed flute, and thus making it a firm and solid tube or pipe. One of these is straight and the other curved. The instrument is 50 inches long on its convex side, and 4 inches in diameter at its bell mouth.

Fig. 184.

DETAIL OF MOUTH HOLE OF FIG. 183.

Showing mode of repairing fractures by pouring on melted metal.

Fig. 185.

BRONZE HORN.

Tralee, County Kerry, Ireland.

Sir John Evans, Ancient Bronze Implements, p. 359, fig. 441.

Fig. 187 represents one of four trumpets found in a bog on Loughna shade, County Armagh, in 1794. It is made of hammered sheet bronze, in two pieces, bent longitudinally and placed together to form the cylindrical tube as shown. Its seams were fastened by riveting; a strip of sheet bronze half an inch in width is laid upon the seam internally

(as in fig. 190*a*) and the two thicknesses of bronze are fastened together by rivets seven-eighths of an inch apart. The lower part of the instrument has been patched in several places by plates and collars riveted on. The upper part of the instrument was joined in the same way, but apparently ruder. The bell mouth of the instrument is finished with the large ornamented cast boss shown in fig. 188. The boss is 7½ inches in diameter and has its peculiar ornamentation. The instrument is about 6 feet in length measured on the convex curve.

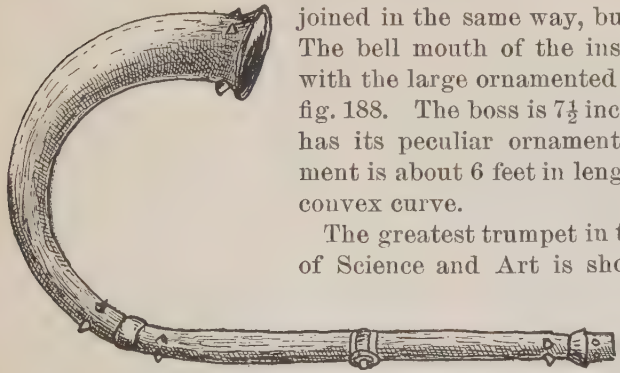


Fig. 186.

BRONZE HORN.

Tralee, County Kerry, Ireland.

Evans, Ancient Bronze Implements, fig. 440.

The greatest trumpet in the Dublin Museum of Science and Art is shown in fig. 189. It was found in 1809 at Ardbrin, in County Down. It is 8 feet 5 inches long on the convex side, is 3½ inches diameter at the largest and $\frac{5}{8}$ inch at the smallest end. It is of sheet bronze, yellowish red, bent and fastened with rivets, as in the specimen, fig. 187, but finer and of better workmanship. Fig. 190 *a*, *b*, shows the method of riveting adopted. The strap and rivet heads are on the

Fig. 187.

HORN OF HAMMERED SHEET BRONZE.

Length, 6 feet.

In Museum of Science and Art, Dublin. Wilde, Catalogue of Antiquities, Royal Irish Academy, pp. 625-627, 630, fig. 527, No. 8.

inside (*a*), with no strap on the outside. The edges are brought close together, holes punched, rivets inserted and hammered down (*b*). The mouthpieces of figs. 187 and 189 both were lost.

Fig. 191 represents a hollow tube similar in appearance to that in

fig. 186. It is 24½ inches long, 1½ inches in diameter, with four circles of spikes, four spikes in each circle. Sir W. R. Wilde[1] is of the opinion that this instrument served as the handle of a battle-ax or commander's baton or staff. But Sir John Evans[2] is of a different opinion. Both he and Mr. Ousley class it as an instrument of music. A similar instrument, also of bronze, 24 inches in length, found associated with other bronze trumpets at Dunmanway, County Cork, is in the British Museum.[3]

Fig. 188.
DETAIL OF ORNAMENTED CAST BOSS ON BELL MOUTH OF FIG. 187.
Diameter, 7½ inches.

Among the horns belonging to the Museum of Science and Art, Dublin, is one of willow wood, 6 feet 4 inches long, 3½ inches in diameter at the large end and tapering straight to the small end, where it is supposed a mouthpiece was fixed, which is, as usual, gone. The piece of wood, originally solid, was split, hollowed out through the center from end to end, replaced and bound together with a strip of brass or bronze

Fig. 189.
HORN OF HAMMERED SHEET BRONZE.
Length, 8 feet 5 inches.
In Museum of Science and Art, Dublin.
Wilde, Catalogue of Antiquities, Royal Irish Academy, pp. 625, 631, fig. 528, No. 9.

[1] Catalogue of Antiquities of the Royal Irish Academy, I, p. 492, fig. 360.
[2] Ancient Bronze Implements, p. 357, fig. 438.
[3] *Idem.*, pp. 357, 358.

1¼ inches in width, wound on the outside spirally from end to end and fastened with small brass or bronze nails. It was found in County Mayo, 1791, in a turf bog, about 9 feet beneath the surface, was perfectly straight and the wood sound, but since warped out of shape in drying.

Other pieces of wooden horns were found in 1837 in a bog at Killyfaddy, near Clogher, County Tyrone. These were made in the same manner as the foregoing, about 28 inches long, 2 inches in diameter, and with dowel tubes which fit together as a flute. (See figs. 186–191.) When put together they made a single tube 9 feet long and forming about two-thirds of a circle. Ralph Ousley, Esq., describes the foregoing objects in the Transactions of the Royal Irish Academy,[1] where he announced the opinion that these, especially the first, were "trumpets, called in Irish tales and romances 'Benwowen or Buabhal, a military instrument used only in emergencies, and capable of producing a most tremendous sound.'"[2]

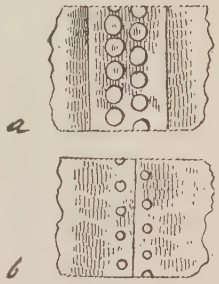


Fig. 190.

DETAIL OF JOINING OF THE EDGES OF FIG. 189.

(*a*) interior, showing the rivet heads; (*b*) exterior, showing where riveted down.

Fig. 191.

HOLLOW BRONZE TUBE.

Length, 24½ inches; diameter, 1½ inches; fragment, possibly a musical instrument.

Wilde, Catalogue of Antiquities, Royal Irish Academy, p. 492, fig. 360; and Evans, Ancient Bronze Implements, p. 357, fig. 438.

SCOTLAND.

Bronze horns.—Fig. 192 is a bronze trumpet, molded and cast, found in Ayrshire, Scotland, in the year 1654, and is known as the Capring-

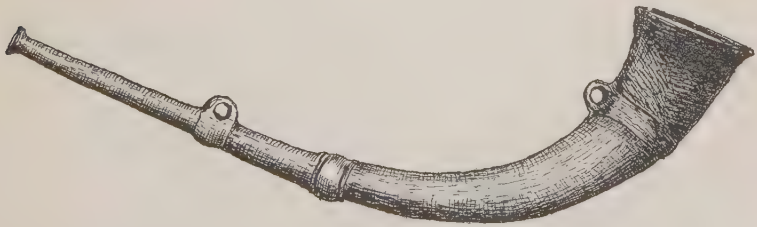


Fig. 192.

THE "CAPRINGTON HORN," BRONZE, MOLDED.

Length, 25 inches.

Tarbolton, Ayershire, Scotland.

Proceedings Society of Antiquaries, Scotland, XII, p. 565.

[1] Volume IV.

[2] Sir W. R. Wilde, Catalogue of Antiquities of the Royal Irish Academy, I, p. 244.

ton horn. It is described in Proceedings of the Society of Antiquaries of Scotland[1] and in Sir John Evans's Ancient Bronze Implements.[2] It is 25 inches in length, and is more curved at the large than at the small end. Its analysis is given in the latter authority:

Copper	90.26
Tin	9.61
Loss	.13
	100.00

ENGLAND.

Bronze horns.—According to Sir John Evans—[3]

English trumpets of bronze belonging to prehistoric times are of rare occurrence. One found in the River Witham, Lincolnshire, has been figured in the Philosophical Transactions,[4] and is nearly straight for the greater part of its length (about 28 inches), curving upward near the end into an irregularly-shaped expanding mouth. It has an ornament or crest like a mane along the exterior curve. In form it is not unlike the carnyx, which is brandished by the horseman on the coins of the British princes Eppillus and Tasciovanus,[5] and which also appears on some Roman coins and monuments commemorative of Gallic and British victories. The metal on analysis gave copper 88, tin 12, and the tube was formed from a hammered sheet and soldered with tin. It not improbably belongs to a period not far removed from that of the Roman invasion of this country.

Another, with two joints and a perfect mouthpiece, is said to have been found at Battle, Sussex, and has been engraved by Grose.[6]

Fig. 193.
BRONZE BELL, MOLDED.
Dowris find, Ireland.
Museum of Science and Art, Dublin.
Wilde, Catalogue of Antiquities, Royal Irish Academy, pp. 612, 613, fig. 523.

Bells or rattles.—Sir John Evans[7] reproduces a bell or rattle "formed of a hollow egg or pear-shaped piece of bronze with a pebble or piece of metal inside by way of clapper." Fig. 193 represents this object. It is to be noted that this bell bears a great resemblance to the prehistoric ones found in Mexico. Sir John Evans continued his description, which is here given entire because of the frequent suggestion made that the Mexican bells were of European manufacture. The only reasons for this belief is their similarity of form and appearance with those manufactured in Europe, and that

[1] Volume XII, p. 565.
[2] Page 362, fig. 445.
[3] Ancient Bronze Implements, p. 363.
[4] Volume LXXXVI, 1796, plate XI; Horæ Fer., plate XIII; Arch. Journ., XVIII, p. 150.
[5] Evans, "Ancient British Coins," plate III, No. 11, and plate V, No. 10, etc.
[6] Ancient Armour, plate XIII; Gough's Camden, IV, p. 231.
[7] Ancient Bronze Implements, p. 364, fig. 446.

ancient explorers, especially those from Spain, mention hawks' bells as objects of trade with the aborigines:

The only (similar) examples which I am able to adduce are those which formed part of the Dowris hoard (Ireland), one of which is represented in fig. 446. There are three such in the Royal Irish Academy and four in the British Museum. With the latter is a smaller plain bell of the same character and two unfinished castings. Sir W. R. Wilde observes that in casting, the metal appears to have been poured into the mold by an aperture at the side, through which the core of clay that contained the metal clapper was broken up. The mold was in two halves and the rings and staples at the ends were cast together. In the perfect examples at the British Museum the sides of the holes by which the core was extracted have been hammered together, so as in some cases to be almost closed. In one instance there is some appearance of the sides having been brazed together.

The sound emitted by these bells is dull and feeble. Like the modern horse bells, a number of them may have been hung together, and not improbably employed in a similar manner to attract the attention both of the eye and the ear.

This bell was part of the "Dowris find," Kings County, Ireland (as was the trumpet, fig. 181), described in Sir W. R. Wilde's catalogue,[1] who says that they were of great antiquity may be inferred from the character of the metal of which they are composed, as well as the circumstances under which they were found. They were believed to have been the ecclesiastical bells used by the Druid priests, and as such have been called "crotals," but there is not sufficient authority to state this confidently. A number of these, and others more spherical, have been found in Ireland. The globular ones are $1\frac{1}{4}$ to $2\frac{3}{4}$ inches in diameter, while the specimen represented in fig. 193 is $6\frac{1}{2}$ inches long, including the ring, and $2\frac{2}{10}$ inches in diameter. We shall later refer to specimens of great similarity found in Mexico and Central and South America regarding which a priori theorists have jumped at the conclusion that because of this similarity with modern and Old World forms they were imported, or at least were white man's work. We shall also see how Prof. W. H. Holmes, in his paper on "Ancient art of the Province of Chiriqui,"[2] denounces and upsets this theory.

GAUL.

Trumpets, or war horns.—Fig. 194 represents one of the prehistoric Gaulish trumpets, or war horns. It belongs to France. No complete original of this has ever been found, but from fragments and from a representation upon the Roman triumphal arch at Orange, archæologists have been able to reconstruct and reproduce it. On that arch a Gaulish soldier is represented as sounding his trumpet, from which it is supposed to have been a war trumpet. The other objects of bronze and of gold found and identified as belonging to Gaul at and prior to the Roman conquest demonstrate the entire capability of these people to make such instruments, while the discovery of the fragments and partially destroyed pieces establishes affirmatively the fact of their

[1] Page 613.

[2] Sixth Annual Report of the Bureau of Ethnology, p. 51 et seq.

existence. Roman historians of the time of Cæsar have reported and described these instruments from Gaul, and Polybius[1] says that—

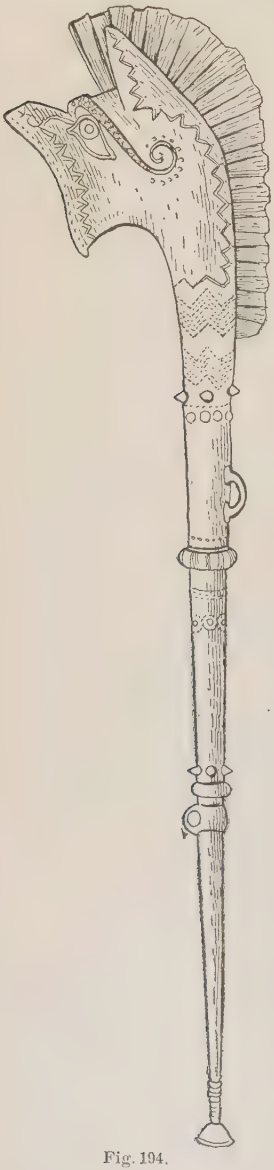


Fig. 194.

BRONZE WAR TRUMPET (Carynx), CAST.

Used in Gaul, in the time of Cæsar. After Gresset.

> The parade and tumult of the army of the Celts terrified the Romans, for there was amongst them an infinite number of horns and trumpets which, with the shouts of the whole army in concert, made a clamor so terrible and loud that every surrounding echo was awakened, and all the adjacent country seemed to join in the horrible din.

Diodorus[2] says of the Gauls that they had barbaric trumpets of a special nature which gave a hoarse sound well suited to the din of battle. The use of war trumpets among the Celtic population of western Europe has been more than once mentioned by classic writers, and passages from them have been cited by Sir John Evans, Sir Augustus W. Franks, and others.[3] Smith's Dictionary of Greek and Roman Antiquities describes the lituus as a sort of trumpet slightly curved at the extremities, differing both from the tuba and cornu, the former being straight and the latter bent into a spiral. Lydus calls the lituus the sacerdotal trumpet, and says it was employed by Romulus when he proclaimed the title of his city. Acro asserts that it was peculiar to cavalry, while the tuba belonged to infantry. Its tones are characterized as harsh and shrill. The Roman lituus seems to have been much the same shape as the figure here given (fig. 194), which was called the carnyx, the end of which was sometimes made to represent the fanciful head of an animal.

A horn, not prehistoric, but of high antiquity and well known in ancient history, is that of Charlemagne, preserved in the treasury of the cathedral of Aix-la-Chapelle. It is ivory, and was made from a veritable elephant tusk. A cast of it is in the museum of the Conservatory of Music in Brussels (No. 1158), and its scale (obtained from this copy) is from C flat below, to F within, the staff.

[1] Liber II, chap. 29.

[2] Liber V, chap. 30.

[3] Livy, Liber V, chaps. 37 and 39.

ETRURIA.

The only mention by Dennis of music or musical instruments as having been found in Etruria is that of—

> A singular spear or rod with a number of movable disks which might have been rattled together so as to keep time, and which, as it was found in connection with armor and weapons, seems to mark it for military use and may have served as an accompaniment to a band. A similar instrument was found in the neighborhood which had on its top the figure of a naked man dancing.[1]

This describes the tintinnabulum which was in use in different parts of the eastern hemisphere in prehistoric times. This instrument is figured and described in De Mortillet's "Musée Préhistorique"[2] and in Wilson's "Swastika"[3] as found from India to the Swiss Lake dwellings.

There have been several specimens, the handiwork of prehistoric man, found in his graves or stations, cited by authors on music, not themselves archæologists, under the supposition that these were musical instruments; but this is only a hypothesis and subject to confirmation by future discovery. The Archæological Journal, 1864, reports the discovery of a bone which Professor Owen pronounced to be that of the Irish elk. It was found in a moat at Desmond Castle, Ireland, and was thought to have formed part of a musical instrument, notably the Irish lyra. The uncertainty of this contention is apparent when it is noted that other persons equally, and perhaps better, qualified to judge, gave it as their opinion that it formed part of a crossbow. Others have reported the tusks or teeth of cave bear, dog, and other animals, found with holes drilled, one can now almost say with certainty, for suspension, but the musicians have tried to convert them into whistles. This they do by saying that to stop the hole on the opposite side and blow as in the cylinder of a key it will make a whistling sound.

Other individuals have supposed that pieces of hard stone, notably jade, with one or more holes drilled therein, were used as musical instruments, because when suspended and struck, they gave forth a sonorous sound. This is not impossible, but it is improbable.

There are in the United States National Museum scores of objects of jade which have been sawed and otherwise elaborately carved and worked, and which have been drilled with one or two holes. (Plates 39, 40.) It also has, as does every other collection, gorgets and so-called ceremonial objects, drilled as for suspension, all of which are, to a certain extent, sonorous and will emit a musical tone when struck; but the same thing is equally true of any reasonably large flake or blade of flint or obsidian. The large chalcedonic spearheads from Arkansas, the flint, rhyolite, and chalcedonic leaf-shaped implements will likewise emit a sonorous sound when suspended and struck. It is evident

[1] Dennis, Etruria, II, p. 444. [2] Fig. 1230. [3] Page 799, fig. 29.

that none of these were ever intended for musical instruments, and this effectually disposes of the claim that the former objects were so used. Almost any piece of steel, or even iron, certainly glass, made in modern times, will emit a sonorous sound; but when these materials are utilized in the construction of musical instruments, that intention is always apparent. (See p. 526.)

The United States National Museum possesses a large, interesting, and valuable collection of musical instruments, which have been obtained primarily through the interest of the late Dr. G. Brown Goode, the assistant secretary of the Smithsonian Institution, in charge of the National Museum. Very many of these are extremely primitive and might well have served in prehistoric times. Their use by savages and primitive peoples in the earliest stages of their history shows an almost certain connection with prehistoric times. It has, therefore, been considered proper that they should be noticed among prehistoric instruments.

The Museum has also published various memoirs and ethnological papers, reports of travels, descriptions and catalogues of collections, wherein savage and primitive musical instruments have been figured. It is deemed wise to employ this material so far as it relates to or will elucidate the subject in hand so that it may be brought together, and, so far as possible, a view of prehistoric musical instruments, especially those in the United States National Museum, presented.

The principal among these publications are: "The Shofar, Its Use and Origin,"[1] by Dr. Cyrus Adler, curator of oriental antiquities; "Notes on the Ethnology of Tibet,"[2] by William Woodville Rockhill; "The Indians of the Northwest Coast,"[3] by Lieut. Albert P. Niblack, United States Navy; "Ethnology of Ungava District, Hudson Bay Territory,"[4] by Lucien M. Turner; "A Study of Siouan Cults,"[5] by J. Owen Dorsey; "The Point Barrow Esquimo,"[6] by John Murdoch. These will be employed in connection with unpublished Museum material, and the whole arranged geographically.

Palestine and Syria.

Dr. Cyrus Adler, speaking of the shofar,[7] says:

> It is not only the solitary musical instrument actually preserved in the Mosaic ritual, but is the oldest form of wind instrument known to be retained in use in the world. (Musical Instruments, Historic, Rare, and Unique, by A. J. Hipkins, Edinburgh, Black, 1888, p. 12; and Musical Instruments, by Carl Engel, London, 1875, South Kensington Museum Art Books.) * * * Professor Steinthal pointed out

[1] Report U. S. Nat. Mus., 1892, pp. 437–450, plates XCVII–C.
[2] Report U. S. Nat. Mus., 1893, p. 715, plate XXIV.
[3] Report U. S. Nat. Mus., 1888, pp. 329–364, plates LVIII–LXII.
[4] Eleventh Annual Report of the Bureau of Ethnology, 1889–90, p. 259.
[5] *Idem*, p. 455.
[6] Ninth Annual Report of the Bureau of Ethnology, 1887–88, pp. 385–389.
[7] Report U. S. Nat. Mus., 1892, p. 437, plate XCVII.

SHOFARS AND OTHER HORNS.
Palestine and Syria.
Adler, Report U. S. Nat. Mus., 1892, plate XCVII.

EXPLANATION OF PLATE 68.

Fig. 1. MODERN SHOFAR, ORDINARY FORM.
(Cat. No. 154402, U. S. N. M.)

Fig. 2. SHOFAR, ITALIAN FORM.
(Cat. No. 95142, U. S. N. M.)

Fig. 3. AFRICAN WAR HORN (antelope).
(Cat. No. 4960, U. S. N. M.)

Fig. 4. SHRINGA.
(Cat. No. 92709, U. S. N. M. India.)

Fig. 5. SIAMESE COPPER HORN.
(Cat. No. 27293, U. S. N. M.)

Fig. 6. LARGE AFRICAN WAR HORN OF IVORY. From plaster cast in U. S. National Museum. (Original in museum of Wesleyan University, Middletown, Connecticut.)
(Cat. No. 94892, U. S. N. M.)

Fig. 7. SMALL AFRICAN WAR HORN OF IVORY. From plaster cast in U. S. National Museum. (Original in museum of Wesleyan University, Middletown, Connecticut.)
(Cat. No. 94893, U. S. N. M.)

Fig. 8. IVORY WAR HORN.
(Cat. No. 127193, U. S. N. M. Byanzi, Africa.)

Fig. 9. AFRICAN WAR HORN.
(Cat. No. 5412, U. S. N. M.)

Fig. 10. EMBUCHI; IVORY WAR HORN.
(Cat. No. 4793, U. S. N. M. Pala Ballas, Africa.)

Fig. 11. IVORY WAR HORN.
(Cat. No. 4793, U. S. N. M. West coast of Africa.)

Fig. 12. IVORY WAR HORN.
(Cat. No. 127195, U. S. N. M. Byanzi, Africa.)

that this was an instrument no doubt used in prehistoric times. * * * (p. 448). Wetzstein is of the opinion that the use of the ram's horn may have been borrowed by the Israelites, and goes back to a people who were engaged solely in the care of sheep. By these it was used as a signal of alarm. * * * (p. 438). There seems to be little doubt that it has been continuously used in the Mosaic service from the time it was established until now. * * * The shofar was not the only natural horn used by the Israelites as a musical instrument, but no copies or representations of the other instruments have come down to us.

The shofar is described at length by Dr. Adler, together with the regulations as to its use and the reference made to it in the Bible. He says (p. 446):

From the Talmud we learn that the use of the shofar as a note of alarm of war was transferred to other seasons of danger and distress. Famine, plague of locusts, and drought (Mishna Taanith, I, 6) occasioned the blowing of the shofar.

The shofar was employed at the public ceremony of excommunication. (Wetzstein, p. 67.)

A very curious use of the shofar in later times was in funeral ceremonies. (Wetzstein, p. 67.) I agree with Wetzstein that this use of the instrument is quite apart from the usual Semitic custom, and it was probably borrowed.

As a signal instrument of war it has its various uses, possibly according to the note that was blown. It was the signal for going out to battle, for the announcement of a victory, and for a recall of the troops.

He figures many shofars on plates XCVII–C, which are fully described, and to which reference is made for further information. But in the plate first mentioned he shows many aboriginal horns similar to the shofar, principally from Africa.

Figs. 1 and 2, plate 68, are shofars (his plate XCVII) assigned to Palestine and Syria. They are described as made of a ram's horn straightened and flattened by heat. The bore of the instrument is a cylindrical tube of very small caliber, which opens into a kind of bell of parabolic form.

Fig. 195 is labeled as a Naigha, David's pipe, from Palestine, a double pipe of two parallel tubes of cane attached by cords. Each tube has four finger holes. The mouthpieces are

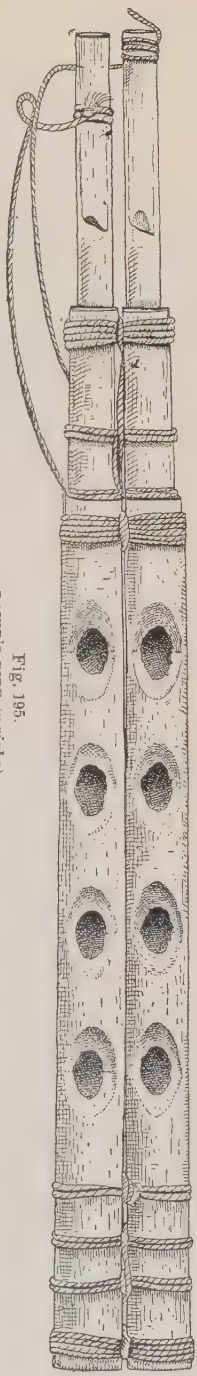


Fig. 195.
DAVID'S PIPE (*naigha*).
A double pipe of parallel tubes of cane attached by cords.
Length, 9 inches.
Palestine.
Cat. No. 99883, U.S.N.M.

made separate and inserted in the smaller ends. They are close together and are intended to be blown both at the same time. The instrument is of the clarionet type. Vibrating reeds are attached to these small mouthpieces by cords wound about them at the outer end, leaving the inner end free for vibration. The free ends of the cords by which the parallel tubes are bound are attached to the mouthpieces to prevent loss. The length of this instrument is 9½ inches, the diameter of the tube is ½ inch, of the mouthpiece ¼ inch. (Gift of A. B. Karny.)

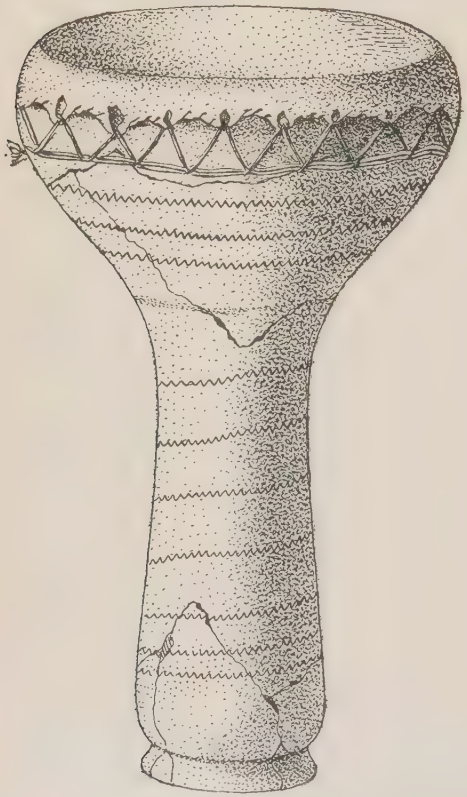


Fig. 196.
POTTERY DRUM (*derbouka*).
Beirut, Syria.
Cat. No. 95147, U.S.N.M.

Fig. 196 represents a pottery drum from Syria. (Collected by Erhard Bissinger, United States consul.) The shell is of red earthenware in the shape of a longitudinal section of a bottle. It has a parchment head stretched, stitched, and glued in place. The pottery is decorated with incised zigzag lines nearly equidistant throughout the length of the instrument. It is 16½ inches in height, and its respective diameters are 3¾ and 10⅜ inches.

The musical instruments of the Bible are not considered in this paper other than Dr. Adler's reference to the shofar. They will be well known to all readers, and their presentation here would only be a work of collation. They are of sufficient antiquity to be classed as archæologic, and could well have a place in any work on the history of music; but the people who used them had an enlightened civilization, and the instruments themselves were far from being prehistoric, although they may have been primitive.

India.

Fig. 4 (Plate 68) represents the shringa, a common ox or buffalo horn scraped and polished, the tip cut off, and a hole made or enlarged in the end, half an inch in diameter, to serve as a mouthpiece. This enlargement is made with a hot iron, without any attempt to spread or stretch

the horn or to form a cup-shaped mouthpiece, as has been done so frequently with similar instruments, both ancient and modern. Of this instrument Dr. Adler says (p. 449):

In form it differs in nowise from the shofar. It is an ancient outdoor wind instrument commonly known as the Indian horn, and was the favorite instrument of the Hindu god Siva. * * * The metallic descendant from the Indian buffalo horn, the shringa, is the rana-shringa, an outdoor instrument made of copper, formerly used in military, and now universally in religious processions throughout India, both by Hindus and Mohammedans, the performers usually being Hindus of the lower caste. In the villages of southern and central India the watchmen blow it at sunset and at certain hours of the night, like the German *nachtwachter*. In large cities a hornblower is always attached to the police. There is seldom a guard or detachment of native irregular troops without one. It is employed in all processions, temple services, marriages, and other festive occasions, and at funerals. [See Capt. Meadows Taylor, Proc. Roy. Irish Acad., IX, plate 1, p. 110.] Another trumpet of the same class is the kurna, used chiefly in religious processions, or in festivals in honor of local divinities. Only Brahmins and persons of a certain rank are permitted to use the kurna. It is esteemed by all Brahmins to be the most ancient instrument of music in existence, and the sound of it to be especially pleasing to the gods in various particular ceremonies and at solemn parts of the sacrifice.

This particular specimen is black in color, 12½ inches in length, and 2½ inches in its greatest diameter.

The conch shells of India, like those of some other countries, have the apex ground or cut off until a hole is opened, sometimes directly, sometimes laterally, which forms a mouthpiece. The natural cavity of the shell forms the bore. Specimen, Cat. No. 92711 (U.S.N.M.) is a horn called Shanka, made from a shell of the *Turbenella pyrum* which has been treated in the same manner. Its length is 6 inches, diameter 3¾ inches. Specimen, Cat. No. 92712 (U.S.N.M.) is a horn named Gomukha, and made from a cassis or helmet shell. Its length is 10 inches, diameter 8¼ inches. Specimen, Cat. No. 92713 (U.S.N.M.), a shell (*Pterocera*), has been treated in the same manner and made into a horn called Barataka. Length 11½ inches, width 4½ inches.

Tibet.

The musical instruments of the Tibetans, while not prehistoric, are quite primitive. They are described by Mr. Rockhill, in his "Journey through Mongolia and Tibet,[1]" published by the Smithsonian Institution, as drums (yang ko ku), gongs, cymbals, and tambourines (t'ai-p'ing ku), and figured in his "Notes on the Ethnology of Tibet,[2]" wherein he describes them more at length. Those employed in religious observances or in church ceremonies are the small hand drum (damaru), frequently made of children's skulls and covered with snake skin, and the bell (drilbu). On his plate 40, figs. 1 and 2 are damarus, of which fig. 2 is made of two skulls attached by a wooden disk. Heads of devils and skulls are painted on them in red and blue colors. A small cotton

[1] Pages 56, 57, 59, and 336.

[2] Report U. S. Nat. Mus., 1893, pp. 715–739, plates 24, 40, 41.

band covers the disk between the two heads and projects a few inches, so as to be held in the hand. Fig. 1 is smaller and the skulls are not painted, but the band is of embroidered satin, decorated with elaborately knotted Chinese silk tassels. The bell (drilbu) is of bronze and usually about $2\frac{3}{4}$ inches in diameter. His figs. 4 and 5, plate 41, represent such bells. Fig. 4 is made in Derge, famous for its clear-toned bells. Fig. 5 comes from the famous Lamasery of Dolonnor, eastern Mongolia. Musical instruments belonging to Tibet, exclusive of those used in religious worship, plate 69 (his plate 24), are (1) the whistle (ling-bu, figs. 1–3) of bamboo or the bone of an eagle's wing, with six or seven key holes; (2) the jew's-harp (k'a-pi, figs. 4–6), and (3) the banjo or guitar (piwang, kopong, or dra-nyan), with three or more strings. The latter is not figured by Mr. Rockhill. The figures of the former sufficiently explain themselves, but the jew's-harp is here described because of its occurrence among distant savage peoples.

Mr. Rockhill says:

> The jew's-harp is made not by the Tibetans, but by the Lissus and other non-Tibetan tribes inhabiting southeast Tibet, and is a favorite instrument in eastern Tibet, where nearly all the women carry one suspended from their girdles. Three harps are used simultaneously, each giving a different note; the deepest note is called p'o kä or "male sound," the intermediate one ding kä or "middle sound," the sharpest one mo kä or "female sound." They are held the one below the other in the order above given between the thumb and the index finger of the left hand, and struck with all the fingers of the right hand, the one after the other. These k'a-pi are carried in small bamboo cases ornamented with little rings of bamboo, often dyed, and also with geometric carvings, which are also colored. They are shown in the lower portion of this plate.
>
> Jew's-harps similar to those used in Tibet are found among the Ainu and in New Guinea, but in many other countries where a bamboo harp is used, the sound is produced by jerking the harp by a string. This is the case in Assam, in parts of Sumatra, among the Yakuts, the tribes of Torres Straits, etc. (p. 715.)

Egypt (Thebes and Cairo).

Fig. 197 represents a tube of cane with four finger holes (collected by Dr. George Sampson). Its length is 5 inches, its diameter $\frac{1}{2}$ inch. In the upper end of this tube another piece of cane, the outside

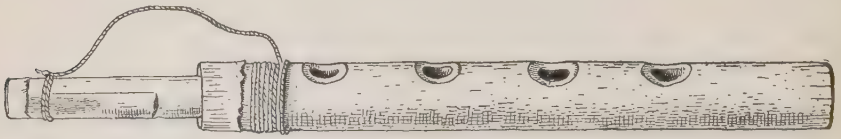


Fig. 197.

SINGLE REED INSTRUMENT (*zoommarah*).

Thebes, Egypt.

Cat. No. 74600, U.S.N.M.

diameter of which is equal to the inside diameter of the former tube, is inserted, projecting $1\frac{1}{2}$ inches; this forms the mouthpiece of the instrument. To prevent its loss the mouthpiece is attached to the tube with a cord.

EXPLANATION OF PLATE 69.

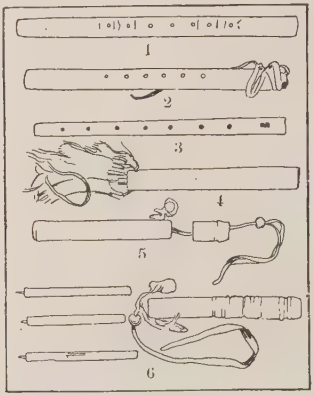


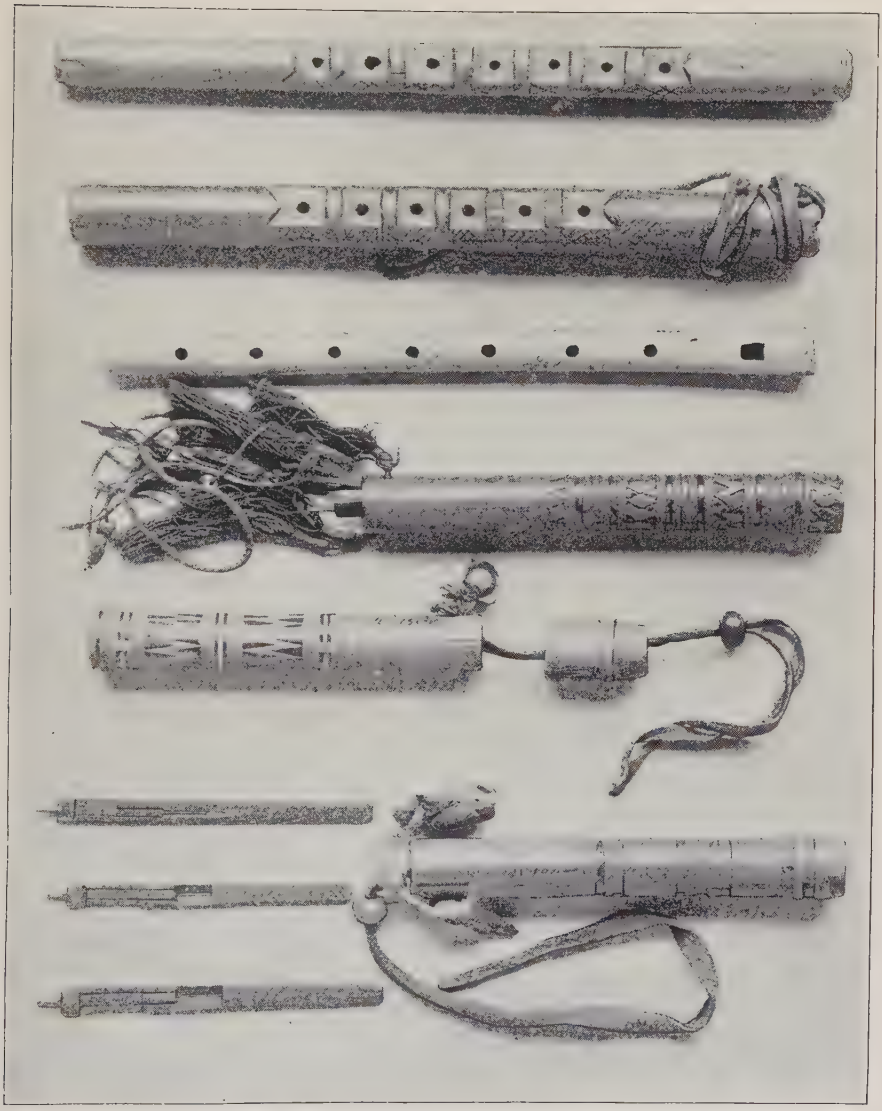
Fig. 1. Bamboo Whistle. Bat'ang.
(Cat. No. 167165*a*, U. S. N. M.)

Fig. 2. Bamboo Whistle. Bat'ang. Strap to tie to girdle.
(Cat. No. 167165*b*, U. S. N. M.)

Fig. 3. Eagle Bone Whistle. Kokonor Tibetans.
(Cat. No. 167166, U. S. N. M.)

Figs. 4, 5. Bamboo Jew's-harp Cases. Bat'ang.
(Cat. Nos. 167168*c* and 168168*c*, U. S. N. M.)

Fig. 6. Bamboo Jew's-harp and Case. Bat'ang.
(Cat. No. 167168*b*, U. S. N. M.)



WHISTLES AND JEW'S-HARPS.

Tibet.

Rockhill, Report U. S. Nat. Mus., 1893, plate 24.

The instrument is of the reed type, as is shown by the figure. The slip of reed is cut from the mouthpiece against which it lies; the outside end is tied with a thread, and the inside end is left free for vibration. The reed is shaved thin near its fastened end to render it more elastic.

Specimen, Cat. No. 95198 (U.S.N.M.) is a trumpet from Muzmar el Daraweesh, probably made from a rhinoceros horn. It is curved, is lenticular in cross sections, and the bell mouth is bifurcated with notched edges. It has three lugs formed on its outer curved edge, in which are inserted four brass rings. The bore is slightly enlarged at the smaller end to form a cupped mouthpiece. Length, 20 inches; width, 1 to 5 inches; thickness, $\frac{1}{2}$ to $\frac{1}{4}$ inch. It is from Cairo.

Africa.

Fig. 3, plate 68,[1] represents an African war trumpet made from the horn of an antelope. The natural cavity of the horn forms the bore of the instrument. The smaller end, however, has not been cut off, but is left pointed as in nature. About one-fourth the distance from the pointed end a lateral opening has been made into the original cavity which forms a mouthpiece, and through this the instrument is blown.

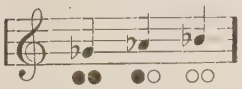
Figs. 6 to 12 in same plate represent war horns from different parts of Africa. They are mostly ivory, and made of elephant's tusks or rhinoceros horn. The natural cavity of the tusk forms the bore. In some cases the horn has been left in its natural state with a lateral mouth hole cut in the concave side as in the shringa. Others, however, are made by cutting off the end and a direct mouth hole worked out of the solid. The localities of these instruments are indicated in the legends.

Fig. 12, plate 68, represents an elephant tusk 4 feet 4 inches in length on the convex side. It has been carved so as to reduce its size considerably and made much more pointed than natural. At the distance of 33 inches from the large end a lateral opening has been made which forms a mouthpiece. This is elliptical and has been enlarged so as to be cup shaped. From the mouthpiece to the large extremity the natural cavity of the tusk forms the bore of the instrument.

Specimen, Cat. No. 95227 (U.S.N.M.) is a wooden horn (Nanga) from Mayumba, Africa, collected by Mr. Carl Strechelman and received from Mr. George C. Webster. It is carved from a solid block of soft light-colored wood. The bore is made with a burning iron. The small end has an enlarged cup-shaped mouthpiece. Its smallest diameter is 1 inch. It increases gradually to near the large end, where it expands with a bell mouth to $4\frac{1}{4}$ inches. It is 28 inches long. The entire exterior has been originally blackened, apparently by fire, while a section of 11 inches at the larger end is decorated by incised lines cut

[1] Report U. S. Nat. Mus., 1892, plate XCVII.

in the burnt wood, which, by bringing out the light color of the interior, shows in circles, lozenges, zigzag, chevron, and festooned forms.

Specimen, Cat. No. 174752 (U.S.N.M.) is a whistle of pottery in the form of a hollow cylinder with two projecting lugs from opposite sides. The mouth hole, three-fourths of an inch in diameter, is at the upper end. At the opposite end is a finger hole three-sixteenths inch in diameter. There is also a finger hole through one of the lugs. The opposite lug is perforated for suspension. It is sounded by blowing across the larger hole and the different notes produced are as follows:

Length, 4⅛ inches; diameter, 1½; width across lugs, 3⅛ inches. Tribe Bakorua, from Sankura, Africa.

Dr. W. L. Abbott describes the "Ethnological Collections in the United States National Museum from Kilimanjaro, East Africa."[1] The locality is thus identified:

A little south of the equator and about 175 miles from the coast of East Africa, rises the splendid mountain Kilimanjaro. It covers an area as great as the Bernese Overland and its greatest peak—Kibo—is over 20,000 feet in height, capped with glaciers and eternal snows. The nearest port on the coast is Mondasa, now the headquarters of the British East African Company.

Dr. Abbott's paper is illustrated by photographs of this primitive people. The list of musical instruments, all of them from the Wa Changa tribe, Mount Kilimanjaro, East Africa, is as follows:

Rattles.—Large iron bell with two balls as sounders; worn by women during pregnancy, on the lower part of the thigh. Length, 4¾ inches. (Cat. No. 151577, U.S.N.M.)

Rattles.—Two small semilunar iron bells, tied to a thong; worn on the ankles. (Cat. No. 151575, U.S.N.M.)

Ankle rattles.—Iron bells, semilunar in shape, with sounders of iron balls, fastened in pairs to a thong of leather and worn on the ankles in dancing. (Cat. No. 151576, U.S.N.M.)

Drum.—Tube of wood closed at one end, with a skin head. Used to call the population to arms. It is carried under the left arm and beaten with right hand. Length, 4 feet 2 inches; diameter, 4½ inches. (Cat. No. 151584, U.S.N.M.)

Cow bell.—A piece of iron, wrought thin and cut in shape of a dumb-bell, then bent at the center so as to form a rude bell, with a clapper attached to the narrow portion at the top. (Cat. No. 151578, U.S.N.M.)

Cow bell.—Native ironwork, similar to Cat. No. 151578. (Cat. No. 151579, U.S.N.M.)

Fig. 198 *a*, *b*, represents one of three rattles from Mayumba, Africa. (Collected by Mr. Carl Strechelman.) Its length is 3¼ inches, width, 1⅞, and thickness, 1⅛ inches. It is double—that is, with rattle at each end, intended to be held in the middle. It is of dark-colored soft wood, the outside charred and then ornamented by incised lines in squares, parallels, chevrons, herringbones, etc. Fig. 198*a* represents a complete drawing, while fig. 198*b* is a longitudinal section showing the interior construction, the formation of the double bell, the clappers of wood, three in number within each bell, and their attachment by an endless

[1] Report U. S. Nat. Mus., 1891, p. 381.

cord which passes through the holes in the clappers and through the body of the bell on each side so that it can be tied or joined. The instrument will be better understood by an examination of the figure.

Islands of the South Pacific Ocean, Polynesia.

Fig. 199 represents the Pandean pipes, or Pipes of Pan, from the Fiji Islands. (Collected by Mr. J. M. Brower, United States consul.) Four pieces of cane of different lengths are placed together parallel and fastened by fine wire which has been passed around each of the four and then drawn into several strands between each cane respectively,

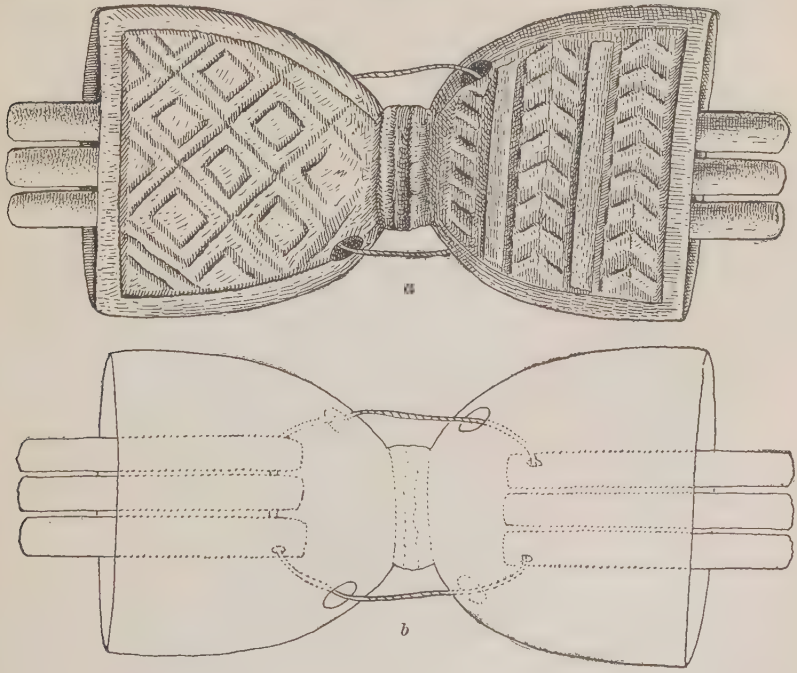


Fig. 198.
WOODEN RATTLE.
a, completed drawing; *b*, longitudinal section.
Mayumba, Africa.
Cat. No. 95216, U.S.N.M. $\frac{5}{8}$ natural size.

thus forming a solid piece. The open ends are on a line, their orifices charred smooth, and the lower ends are closed by being cut at a joint of the cane. The longest cane is 4 inches in length, the shortest 3 inches, and their diameter about $\frac{3}{16}$ inch.

The Greek god Pan is represented as playing on this instrument, blowing in the open holes as he passed them back and forth on his lips, each pipe sounding a different note.

Specimen, Cat. No. 2827 (U.S.N.M) is a war drum, so called, from the Fiji Islands. It is hollowed out like a trough from a log of hard

dark-redwood. The bottom is convex like a cask or barrel. No head of skin is used, as in all drums of modern manufacture. When used it is placed on a coil of rope. It is from Somu-Somu, Fiji, and was collected by the Wilkes Exploring Expedition. It is 55 inches in length, 16 inches in width, and 18 inches in height. The native name for this instrument is lali, and the following description is taken from the label displayed in the United States National Museum:

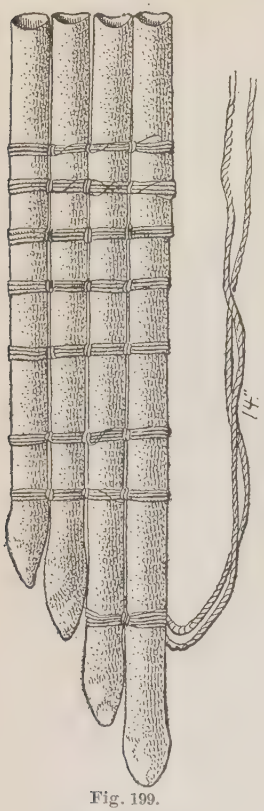


Fig. 199.

PANDEAN PIPES.

Levuka Island, Fiji.

Cat. No. 23942, U.S.N.M. $\frac{2}{3}$ natural size.

The tavola tree of Fiji (*Terminalia catappa*) is said to make the best sounding lalis, although the vesi tree (*Afzelia bijuga*) is also used. "The sides are beaten by two sticks about 18 inches long. In different ways measures or tunes are beaten on them, the meaning of which is known by the natives and the 'old hands' or settlers. The sound of the lali is not unpleasant when beaten by a practiced hand, and a good-sounding one may be heard at a distance of 4 or 5 miles on a quiet evening."—(Horne, A Year in Fiji, p. 114.)

Commodore Wilkes, in his Narrative of the United States Exploring Expedition, states that this drum was given to him by Tiu Thakau, a chief of the island of Somu Somu, together with a thousand yams, in exchange for a musket—the usual price—and a whale's tooth in token of friendship. "After the drum had been presented to me," he continues, "I was desirous of hearing them beat upon it. They have several beats or calls to give notice to the koro (or village), one of which was for calling the people together to the feast of human bodies. They were all distinct and, they said, quite audible at a great distance. The Fiji drum is similar to that described at Tonga, and is made of a log hollowed out and placed on one point. It gives out a deep, hollow tone when struck with the small and large sticks with which they produce the different sounds."—(Vol. III, p. 317.)

Samoa.

Specimen, Cat. No. 3466 (U.S.N.M.) is a conch shell used as a war horn (Pu or Foa-foa) with mouth hole 3 inches from apex. Length of shell, 7½ inches; width, 5 inches.

Specimen, Cat. No. 3825 (U.S.N.M.) is a war horn from Carlshoff Island. It is made from a conch shell (*Triton trinonis* Linnæus) and is covered with a lime deposit.

Spain.

An extremely primitive instrument in the United States National Museum (Cat. No. 95554) is marked Los Huesos, (the bones) Spain, but otherwise the record is silent. It is a rattle of eight leg bones of a sheep, each perforated near the ends and strung on two cords, making

the instrument like a ladder. The sound is made by the bones being rasped one or both ways with another bone or piece of shell. Length, 4½ inches; width, 5 inches.

NORTH AMERICA.

The United States National Museum possesses several primitive, if not entirely prehistoric, musical instruments, gathered by divers persons, most of them operating in the line of ethnology or prehistoric archæology, not a few of whom have been officers of the United States Government who have turned over their collections to the Museum on returning to Washington.

Pursuing a plan of description by geographic distribution, we begin at the extreme north.

ALASKA.

Point Barrow.—Mr. John Murdoch, in his paper on the Point Barrow Eskimo,[1] says:

> The only musical instrument among these people is the universal drum or tambourine (Aelyau), consisting of a membrane stretched over a hoop with a handle on one side. It is used from Greenland to Siberia. It is always accompanied by the voice, singing or chanting. It produced a loud, resonant, and somewhat musical note. There appears to be no system of tuning these drums, the pitch of the note depending entirely upon accident.

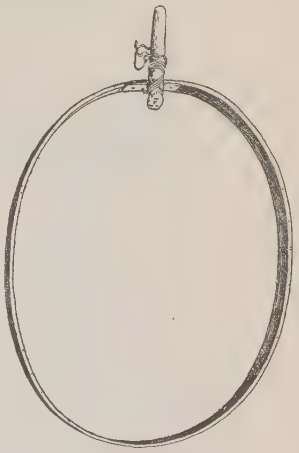


Fig. 200.
ESKIMO DRUM.
Point Barrow, Alaska.
Cat. No. 56741, U.S.N.M. ⅛ natural size.

Mr. Murdoch figures one of these, here reproduced as fig. 200, which is simply a hoop like that of a tambourine, oval, 22 by 19 inches, with a short handle attached. The membrane is a sheet of the peritoneum of a seal stretched over a hoop after the style of a tambourine. The United States National Museum possesses four of these drums, of which Mr. Murdoch says that "every Eskimo household possesses at least one."

The expedition brought home eight handles for these drums which exhibit but slight variations. The commonest material for the handle is walrus ivory; only two out of twelve are of antler. Their length is from 4.6 to 5.4 inches. Fig. 201 *a–d* represents a series of these drum handles taken from Mr. Murdoch's paper. With one exception, all these handles have the large end more or less rudely carved into a human face with the mouth open as if singing. The one exception is fig. *c*, which is the butt end of a small walrus tusk carved to represent a walrus. It has small oval bits of wood inlaid for eyes. The notches by which these handles are fitted into the rim of the tam-

[1] Ninth Annual Report of the Bureau of Ethnology, 1887–88, p. 385.

bourine, and the holes by which it is withed fast are plainly shown in the figures.

Captain Herendeen was interpreter for Captain Ray and accompanied the party during the entire expedition. He is now employed in the

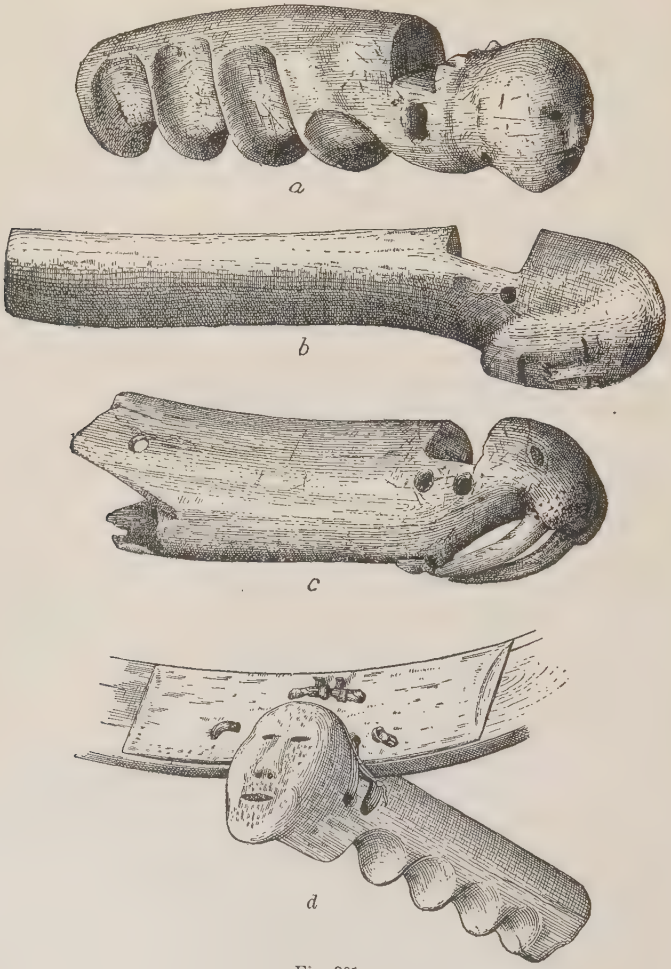


Fig. 201.

HANDLES FOR ESKIMO DRUMS.

Point Barrow, Alaska.

Cat. Nos. (*a*) 89267, (*b*) 89266, (*c*) 56514, (*d*) 56742, U.S.N.M. ½ natural size.

National Museum, and I have asked for his knowledge about Eskimo musical instruments, to which he replies:

The principal machine to be called a musical instrument is the tambourine-like drum.

These drums are carried everywhere by the Eskimo. He beats it when happy, when sad or sick accompanies himself with his dirge-like songs, drives away evil

spirits that torment his family when sick. It is a universal panacea for all the ills of life and a fountain of delight on festive occasions.

Many objects are strung on strings and tied to the belt, notably on little boys; often a small brass bell is thus attached.

Fig. 202 represents a bunch or string of the dewclaws of the woodland caribou, which have been trimmed at the point so as to make an opening, and have been notched at the wide end, probably for decora-

Fig. 202.

RATTLE OF CARIBOU DEWCLAWS.

McKenzie River district, Fort Anderson Eskimo.

Cat. No. 7443, U.S.N.M.

tion. They are eighteen in number. Interspersed with them are several strings of ptarmigan beaks. This is one of the musical instruments mentioned above by Captain Herendeen. The string or loop by which it was attached is shown in the figure. We can imagine the music made by this instrument when attached to the belt of a running, jumping, playing boy. It serves the same purpose in music as does the dulcimer, which, by the latest fad of society people, is hung upon the door of the young ladies' boudoir, with bullets suspended from long

strings, which, being agitated by the closing door, strike the wires, making music whenever the door is moved.

Mr. Murdoch[1] gives a better report of the musical abilities of the Point Barrow Eskimo. He says:

Their music consists of monotonous chants, usually with very little perceptible air, and pitched generally in a minor key. I could not perceive that they had any idea of "tune," in the musical sense, but when several sang together each pitched the tune to suit himself. They, however, keep excellent time. The ordinary songs are in "common" or 4-4 time. The words are often extemporaneous, and at tolerable regular intervals comes the refrain, "A yáña, yáña, a yáña ya," which takes the place of the "ámna aja" of the eastern Eskimo. Sometimes, when they are humming or singing to themselves, the words are nothing but this refrain. Their voices, as a general thing, are musical.

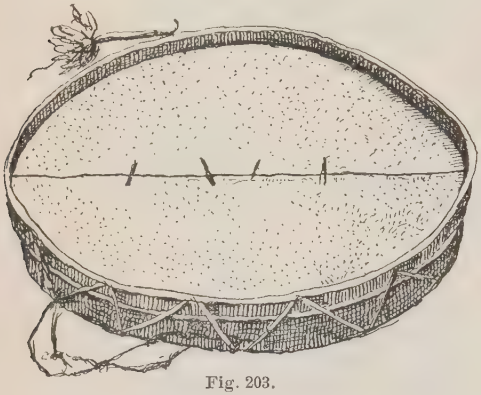


Fig. 203.
DRUM.
Nenenot, Hudson Bay Eskimo.
U. S. National Museum.

Like all Eskimo, they are very fond of music, and are constantly singing and humming to themselves, sometimes, according to Captain Herendeen, waking up in the night to sing. Besides their regular festivals they often amuse themselves in their houses by singing to the drum. They are fond of civilized music and, having usually very quick and acute ears, readily catch the tunes, which they sing with curiously mutilated words. We found "Shoo fly" and "Little Brown Jug" great favorites at the time of our arrival, and one old woman from Nuwŭk told us with great glee how Magwa (McGuire) used to sing "Tolderolderol." Our two violins, the doctor's and the cook's, were a constant source of delight to them.

HUDSON BAY ESKIMO.

Mr. L. M. Turner,[2] speaking of the Hudson Bay Eskimo, says:

The only musical instrument used by these people is the drum or tambourine of the form shown. These drums vary in diameter from 22 to 26 inches. The membrane for the drumhead is a thin reindeer skin tanned.

Fig. 203 represents one of these drums from Nenenot.

Across the membrane is stretched a sinew cord on which are strung at right angles to the cord a number of barrels, made from the quills of the wing feathers of the willow ptarmigan. Across the underside of the membrane is stretched a similar cord with quills.

Mr. Turner figures and describes a similar drum used by the Little Whale River Indians, which drums, he says, differ greatly in construction from those of the Ungava Indians.

The size is rarely so great, seldom exceeding 22 inches. These drums have two

[1] Ninth Annual Report of the Bureau of Ethnology, 1887-88, pp. 388, 389.
[2] Eleventh Annual Report of the Bureau of Ethnology, 1889-90, pp. 324-326.

MEDICINE AND DANCE DRUM. TANNED SHEEPSKIN STRETCHED OVER A WOODEN FRAME. TOTEMIC FIGURE, THE BEAR.

Tlingit, Sitka, Alaska.

(Niblack, Report U. S. Nat. Mus., 1888, fig. 302, plate LVII.)

Cat. No. 127613, U.S.N.M. Collected by Paymaster E. D. Webster, U. S. N.

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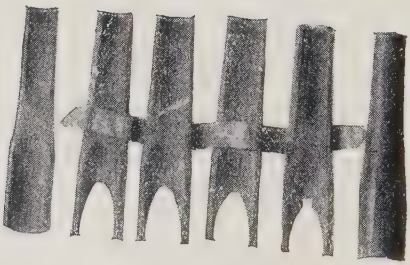

4

WOODEN WHISTLES AND TRUMPETS.
Indians of Northwest Coast.

EXPLANATION OF PLATE 71.

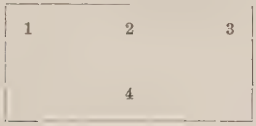

Fig. 1. DANCE WHISTLE. In form of a toy balloon, with a bladder attached to wooden mouthpiece to operate the whistle.

(Cat. No. 89069, U. S. N. M. Haida, Queen Charlotte Islands, British Columbia. Collected by James G. Swan. Niblack, Report U. S. Nat. Mus., 1888, fig. 298, plate LVII.)

Fig. 2. DANCE WHISTLE. With double reed mouthpieces backed with bellows. The cheeks of the bellows are painted, representing Hoorts, the bear.

(Cat. No. 89064, U. S. N. M. Haida Indians, Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan. Idem, fig. 329, plate LXII.)

Fig. 3. CEREMONIAL TRUMPET. Made in six pieces (see fig. 4, this plate), which, when joined, form six chambers, in each of which a piece of fabric is stretched. The different tones are not set to a scale.

(Cat. No. 20687, U. S. N. M. Tsimshian, Fort Simpson, British Columbia. Collected by James G. Swan. Idem, fig. 301, plate LVII.)

Fig. 4. WOODEN TRUMPET. Five-chambered.

(Compare with fig. 3, this plate. Idem, fig. 1), plate LXI.)

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WOODEN WHISTLES AND TRUMPETS.

Indians of Northwest Coast.

EXPLANATION OF PLATE 72.

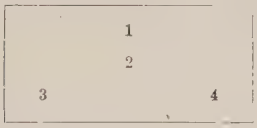


Fig. 1. DANCE WHISTLE. Blown like a fife. Compare fig. 2, this plate.
(Cat. No. 89057, U. S. N. M. Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan. Niblack, Report U. S. Nat. Mus., 1888, fig. 299, plate LVII.)

Fig. 2. CEREMONIAL WHISTLE.
(Cat. No. 89057, U. S. N. M. Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan. Idem, fig. 326, plate LXI.)

Fig. 3. CEREMONIAL TRUMPET. Of wood; made in two sections, with reed between.
(Cat. No. 20689, U. S. N. M. Tsimshian, Fort Simpson, British Columbia. Collected by James G. Swan. Idem, fig. 324, plate LXI.)

Fig. 4. CEREMONIAL TRUMPET. Of wood; in section, to show the vibrating piece.
(Cat. No. 20695, U. S. N. M. Tsimshian, Fort Simpson, British Columbia. Collected by James G. Swan. Idem, fig. 327, plate LXI.)

heads or membranes, fitted on the barrel and secured by a single hoop for each head. The two hoops are then connected by tightening strings. The membranes are invariably made of deerskin in the parchment condition and not of tanned skins.

The snares or thongs across the heads have pieces of wood instead of quills as rattlers. The drumstick, like that of the Ungavas, is of reindeer horn, or else, as if to add to the din, a gun-cap box is pierced through from side to side and a few pebbles or shot placed within. A stick is then inserted through the hole in the box, and the whole covered with buckskin to prevent separation of the lid and box. This makes a distracting noise.

Turner, describing the use of the drum, says:

Nothing is done, nothing contemplated, without sounding the drum. It is silent only when the people are asleep or on a tramp from one locality to another. If a person is ill the drum is beaten; if a person is well the drum is beaten; if prosperous in the chase a drum is beaten, and if death has snatched a member from the community the drum is beaten to prevent his spirit from returning to torment the living. The drumbeat is often accompanied with singing, which is the most discordant of all sounds supposed to be harmonious.

NORTHWEST COAST.

"The Indians of the Northwest Coast" is the title of a paper by Lieut. Albert P. Niblack, U. S. N., based on collections in the United States National Museum and on personal observation in connection with the survey of Alaska in the seasons of 1885, 1886, and 1887. The locality most affected was the coast and islands in southern Alaska and northern British Columbia. The musical instruments which he found were drums, whistles, and rattles, which are described in his paper.[1]

Drums.—The usual type of drum is that shown on plate 70 (his plate LVII), which consists of a piece of deerhide or sheepskin stretched across a circular wooden hoop. They are similar, though not identical, with the drum of the Point Barrow and Hudson Bay Eskimo heretofore described. It has the bear as a totem. It is beaten with an ordinary bass drumstick.

Whistles.—Whistles are shown in great variety on plates 71 and 72 (his plates LXI and LXII). Some of these devices make a hideous noise, especially such as fig. 1 (plate 71), consisting of a wooden whistle and a bladder like a toy balloon, or fig. 2 (plate 71), a whistle backed by a pair of bellows to furnish the wind. The most elaborate instrument of this kind is shown in figs. 3 and 4 (plate 71), both being views of the same; the former put together ready for use, the latter showing the pieces in detail. It consists of six pieces of wood, forming a kind of trumpet with five openings, a continuous narrow band of silk being stretched through these openings. It is blown from the small end, trumpet-fashion, when each section gives forth its sound on a different pitch. Figs. 1 and 2 (plate 72) are views of the same kind of instrument blown flute fashion. The other instruments are like a flageolet, some of them having several finger holes to change the notes. Fig. 3 (plate 72)

[1] Report U. S. Nat. Mus., 1888, pp. 331, 332, plates LVII, LXIII.

has a reed or vibrating piece within, as shown in the sectional view (fig. 4).

Rattles.—These are usually of cedar, generally in sections neatly joined, elaborately carved, and painted with appropriate totem designs. The usual form is a hollow wooden chamber with a dozen or more small pebbles in it. The most primitive mentioned by the early voyagers is composed of two hoops joined by a wooden crosspiece, the circumference being closely strung with the beaks of the puffin.—(His fig. 73, plate XVIII.)

Lieutenant Niblack witnessed one of the great ceremonial dances of these people at Fort Wrangell, September, 1887. Describing their music and musical instruments,[1] he says:

> It consisted in raising the feet alternately in quick succession as high as possible, without moving the body, to the sound of a drum, chorus, and rattle.

He quotes Dawson's description of a dance:

> Some had rattles, and added to the din by shaking these furiously at the accentuated parts of the song. * * * The drum was beaten very regularly with double knocks, thus—tum tum, tum tum, tum tum—and with the sound the dancers kept time in a sort of chant or song. * * *

And from Laugadorff:[2]

> One of the dancers seems, as it were, to lead the rest, carrying in his hand a thick sort of staff ornamented with the teeth of sea otters, which he struck upon the ground to mark the measure. * * * The women sit on the ground at a distance of some paces from the dancers and sing a not inharmonious melody, which supplies the music.

OREGON—(HUPA INDIANS).

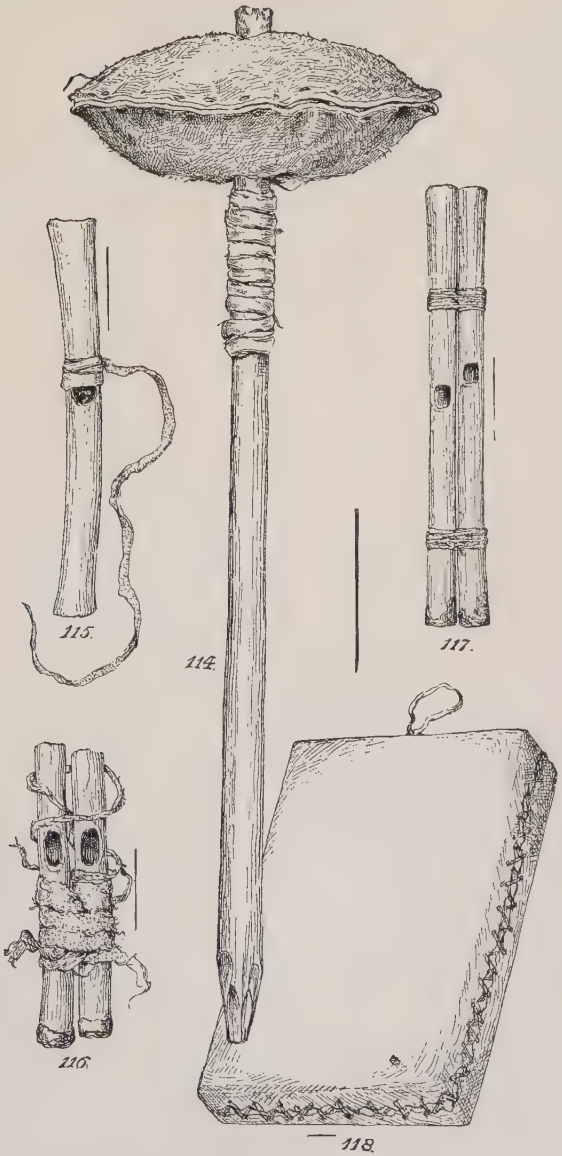
Drums, rattles, and whistles.—Capt. P. H. Ray made an extensive ethnological collection from the Indians in the Hupa Reservation, which is described by Professor Mason in the Smithsonian Report for 1886.[3]

Speaking of the musical instruments, he says:

> Rattles employed by medicine men and in gambling are composed of many hoofs and hoofiets of the blacktail deer. Each piece is pierced through the apex and suspended on a short thread, upon which four white beads are also strung. These pendants are then fastened to a long belt of cloth or leather and worn around the waist or held in the hand. The hoofs striking together produce a sharp rattling sound. A small, graceful lens-shaped rattle, mounted on a stick, is held in the hand of the dancer. (Fig. 114, plate 73. His plate XXVI.)
>
> The Hupa drum is a rectangular box, covered with leather, and has little merit as a musical instrument. (Fig. 118, plate 73. His plate XXVI.)
>
> The Hupa make tolerably agreeable music on a small bone whistle, made either single or double. (Figs. 115–117, plate 73. His plate XXVI.)

Professor Mason concludes with the statement that by the similarity of these with the prehistoric instruments found in the ancient graves

[1] Report U. S. Nat. Mus., 1888, p. 364.
[2] Voyages, 1805, plate II, p. 114.
[3] Part 1, pp. 234, 235.



WHISTLES, RATTLE, AND DRUM.

Hupa Indians.

Collected by Gen. P. H. Ray, U. S. V.

Mason, Ray collection, Smithsonian Report, 1886, Pt. 1, plate XXVI.

of southern California and the islands of the coast the continuity of music in prehistoric times is made out, and he wisely observes (p. 235):

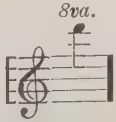
It is an important principle, which archæologists sometimes overlook, that arts may survive and obey the laws of technic evolution even though the men through whose instrumentality they live and have their being have no immediate blood relationship.

To which the author is tempted to add that the survival of identical arts among peoples widely separated by time or space is not evidence of independent discovery or separate invention. The underlying idea of Professor Mason's statement is that this survival of similar arts must have been by teaching of some sort which could only have been accomplished by contact or communication intermediate between the peoples. While a similarity of arts (or of language) is not evidence of consanguinity between different peoples, yet it is evidence of a high order, sufficient in the absence of anything to the contrary, to carry conviction that there has been communication between them of some sort.

Fig. 204.
BONE WHISTLE.
Santa Cruz Island, California.
Cat. No. 18823, U.S.N.M.
¾ natural size.

CALIFORNIA.

Bone whistles or flageolets.—There are in the Museum a number of bone whistles or flageolets, obtained from ancient graves on the California coast and the adjacent islands. The majority are made of the long bones of birds. The simpler forms are plain tubes of various lengths, one end being closed with asphaltum. In others a square or oval vent hole is cut; in most cases near one end, but sometimes nearer the middle. In many specimens there is a transverse ridge of asphaltum fastened to the inside of the tube immediately below the hole, which deflects the current of air over the edge of the hole and makes the musical tone as in a flageolet.

Fig. 204 represents a whistle of bone 3.4 inches in length, from Santa Cruz Island. (Schumacher collection.) One end is closed, and there is a transverse ridge of asphaltum within the tube beneath the vent hole. It is blown from the end, flageolet fashion, and emits but a single note, thus:

In fig. 205 is shown an instrument from La Patera, Santa Barbara County, on the mainland. Dr. C. C. Abbott,[1] speaking of this specimen, says:

It represents a large example of what we must consider a bone whistle, although in its present condition it would not be of use even in a musician's hands. As will be seen in the illustration, the end farthest from the lateral hole is closed, the mate-

[1]Report upon U. S. Geographical Surveys West of the One Hundredth Meridian, VII, Archæology, pp. 234, 235.

rial, as usual, being asphaltum, applied in a soft state, which closes perfectly the irregularly oval opening of the bone at the end. The opposite opening is more

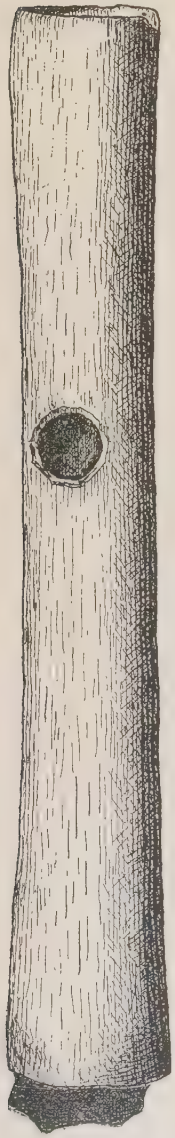


Fig. 205.
BONE WHISTLE.
La Patera, Santa Barbara County, California.
Cat. No. 62664, U.S.N.M.
$\frac{9}{7}$ natural size.

Fig. 206.
BONE WHISTLE.
Santa Cruz Island, California.
Cat. No. 18162, U.S.N.M.
$\frac{11}{13}$ natural size.

Fig. 207.
BONE WHISTLE.
San Miguel Island, California.
Cat. No. 29657, U.S.N.M.
$\frac{3}{4}$ natural size.

nearly circular, and is now without any obstruction. The two ends have been cut or sawed off, and the edges are very smooth and even. The instrument, therefore, was

never longer than at present. It is made of a portion of a leg bone of some large mammal, and is 6½ inches in length. The lateral opening, which is nearly an inch nearer one end than the other, is one-half inch in diameter. The external surface is smooth and even somewhat polished.

Fig. 208.

BONE WHISTLE.

San Clemente Island, California.

Cat. No. 172843, U.S.N.M. ⅝ natural size.

Fig. 206 represents a bone whistle from Santa Cruz Island. It has been coated with a black pigment, probably asphaltum, and has been rubbed or used until it shows a polished surface. It is made from the long bone of a bird, and has the natural opening throughout the interior. About 2 inches

Fig. 209.

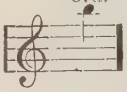
DOUBLE BONE WHISTLE.

San Clemente Island, California.

Peabody Museum, Cambridge, Massachusetts.

from one end a square hole has been cut in the bone, and just beneath it is a transverse ridge of asphaltum. A note or sound is obtained by blowing into the end nearest the vent hole.

Fig. 207 represents a bone whistle from an ancient grave on San Miguel Island, California (Bowers collection). It is made from a tibia of the deer (*Cariacus virginianus*). The upper end has been cut off, the cellular portion of the bone removed, and a side hole placed about $1\frac{3}{8}$ inches from the open end. Opposite this opening and extending to the end on the inside are remains of gum or asphaltum, which formed an air passage on the principle of the modern flageolet. By restoring this with clay, I was enabled to get a sound or note on the instrument thus:



There are two other whistles of like form from Santa Cruz Island (Cat. Nos. 26273 and 26274 U.S.N.M.), but so much cracked and weathered that no attempt was made at restoration.

Fig. 208 represents one of three instruments lately received from Mr. J. Neale Plumb, of New York. They are from San Clemente Island, and were obtained by Mr. Plumb during the summer of 1895 while exploring the shell heaps and graves on the island. There were five of these instruments found together in one grave. These are also made from the tibia of a deer, but, unlike the whistle just described, the lower or smaller end of the bone is cut away to form the mouthpiece.

Fig. 210.

BONE WHISTLE OR FLAGEOLET.

Santa Barbara County, California.

Cat. No. 20532, U.S.N.M. $\frac{8}{11}$ natural size.

This has been carefully worked and smoothed all around. The side or vent hole is about an inch from the end. Small pieces of gum forming the air passage still adhere to the inside of the tube. There are no finger holes, and consequently only one tone could be produced. On the outside are traces of asphaltum, evidently used to hold in place a wrapping of some kind, and near the larger end an ornament made from a piece of iridescent Haliotis shell is held in place by the same material. The instruments found by Mr. Plumb are of unequal lengths, show no traces of asphaltum on the larger end as do the Schumacher specimens (fig. 209), and they were probably intended to be used singly. These were described by Prof. E. S. Holden.[1]

In the graves on the island of Santa Catalina, Schumacher[2] found

[1] Popular Science Monthly, March, 1896.

[2] Report upon U. S. Geographical Surveys West of the One Hundredth Meridian, VII, Archæology, p. 237.

eight double whistles or pipes, and on San Clemente, one, which is here represented as fig. 209. These were made from the tibia of a deer, joined together and held in position by having the lower ends inserted in a mass of asphaltum and then wound with bark, which in its turn was covered with asphaltum and extending nearly the entire length of the instrument. At the distance of an inch and a quarter from the open end were vent holes, one in each bone, with a mass or bridge of asphaltum placed inside in such positions and of such size as to leave but a small space for air. The open ends of both instruments were inserted in the mouth, and it was doubtless blown flageolet fashion.

A bone fife or flageolet is represented by fig. 210, which, being without mouthpiece, is simply a bone cylinder as represented, with four finger holes, and was made from the femur of a bird. Contrary to the foregoing specimen (fig. 209), it is very white and highly polished, with a uniform thickness. It was obtained by Mr. Schumacher from a grave on Santa Cruz Island.

Fig. 211 represents an instrument made from the ulna of the brown pelican. It is without mouthpiece, but has four small finger holes. It is from San Miguel Island, California, and was collected by Mr. W. H. Dall. The ends are so much weathered and broken that it is impossible to say of what the whistling apparatus consisted. There are, however, in the Ethnological Museum collection bone flageolets from Costa Rica (see fig. 273), identical in shape with the one just mentioned and giving a series of musical tones. In these the mouthpiece is at the larger end, which is filled with gum or asphaltum, leaving an air passage which connects with a vent hole about $1\frac{1}{4}$ inches distant. It seems probable that the California specimens were constructed in the same way, but they have become fragile by age and other causes, and in only one or two instances can any tone be produced.

The following list will give the additional instruments in the United States National Museum, the catalogue numbers, with the kind of instrument and the locality where found, collected principally by Messrs. Schumacher and Bowers:

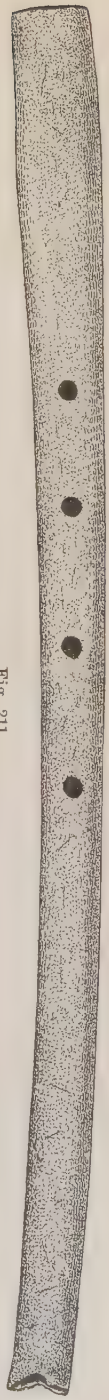


Fig. 211.

BONE WHISTLE OR FLAGEOLET.

San Miguel Island, California.

Cat. No. 14987, U.S.N.M. $\frac{1}{1}$ natural size.

Whistles without lateral opening.

Cat. No.	Locality.	Number.
26280	Santa Cruz Island, California	1
29650	San Miguel Island, California	1
14994	.....do	1
29667	.....do	1

Whistles with lateral opening.

15521	Mare Island, California	1
18162	Santa Cruz Island, California	1
18163	.....do	1
18164	.....do	1
20532	Santa Barbara Island, California	1
21775	San Luis Obispo, California	1
18201	Santa Cruz Island, California	1
26408	San Miguel Island, California	1
29675	.....do	2
18323	Santa Cruz Island, California	5
62664	La Patera, Santa Barbara County, California	1

Whistles or flageolets with four finger holes.

18336	Santa Cruz Island, California	1
20532*a*	Santa Barbara Island, California	1
14987	San Miguel Island, California	1

Undetermined.

26272	Santa Cruz Island, California	1
26273	.....do	1
26274	.....do	1
26275	....do (broken)	1
26276	.....do (fragment)	1
26277	.....do (broken, unfinished)	1
26278	.....do	1
26279	.... do	1
26281	.....do	1
26282	.....do (ornamented)	1
29658	San Miguel Island, California	1
29657	.....do	1
29659	.....do	1
29649	.....do	1
29644	.....do	1

Fig. 212 represents a double flute from the McCloud River Reservation, Shasta County, California (received from Livingstone Stone). The tubes are of soft wood, resembling elder stalk, with bark and pith removed. There are four finger holes in each tube, made with a burning iron. There is no sign of the use of asphaltum, nor is there any

mouthpiece. Both tubes are open from end to end, and it is suggested that they have been blown upon not as a flageolet, but across the hole in the open end of the tube instead of across the lateral hole in the side. What use the four finger holes were is quite undetermined, for, while they are not too great in number, they are so far apart that no person can cover them all at the same time.

Drums and rattles.—There seems to have been among the California aborigines, whether ancient or modern, an almost total absence of these instruments or any musical instruments of percussion.

Capt. George M. Wheeler, United States Engineer in charge of the geographical survey west of the one hundredth meridian, and principally on the coast of southern California, made, or caused to be made, extensive archæological investigations into the prehistoric occupation on the Pacific coast of southern California, especially among the islands. This expedition had the aid of persons at that time the best qualified in the United States to make such investigations. The result was published in Volume VII of the series, and is entitled "Archæology." In the introduction (p. 26), is found the following:

> In the way of musical entertainments it is evident that the Californians were limited to very primitive instruments, the only kinds that have been found in the graves consisting of whistles made of bones of animals. Some of these, however, exhibit considerable ingenuity, and it may be that they were played upon with skill.

This statement is verified by Mr. W. H. Dall, verbally, whose opinion and observation is entitled to great weight because he had, prior to that time, made elaborate and extensive ethnologic investigations among the aborigines of Alaska, prehistoric and modern, where he had found such an extensive and almost universal use of the drum.

The United States National Museum possesses neither drums nor rattles from the southern coast of California, and as for rattles, while they are rare, those which are found belong to modern Indians far in the interior. They are also peculiar in their construction and quite different from those found elsewhere among the aborigines.

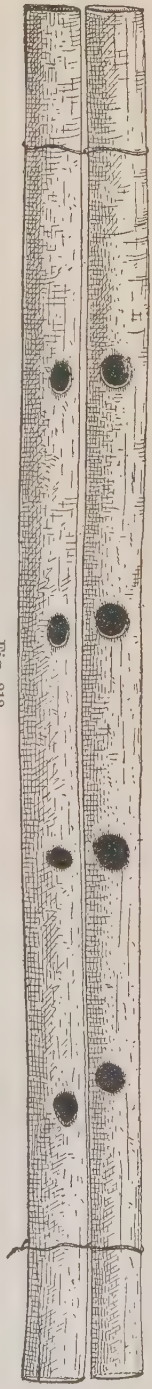


Fig. 212.

DOUBLE WOODEN FLUTE.

McCloud River Reservation, Shasta County, California.

Cat. No. 19315, U. S. N. M. ½ natural size.

Fig. 213 represents an object of pottery, possibly a rattle, from

San Diego, California, collected by Mr. Edward Palmer. The finder reports it as a doll and not an idol nor a rattle. The lower part is spherical; a small orifice is shown in front; through this have been pushed two little pebbles a quarter of an inch in diameter. Whether the insertion of these pebbles was intentional or accidental, we have no means of knowing, nor is it known whether their insertion changed the character of the instrument in the intention of the maker from a doll to a musical instrument. The walls of the sphere are solid and quite thick, and not calculated to give off much sound, and, while the rattling of the two pebbles can be heard, yet they sound but faintly and can be heard only a short distance. The more it is examined, the less certain is the conclusion that it was ever intended as a rattle. Another item is that the protuberances representing ears have been pierced and, though the right ear has been pulled out and the string lost, yet in the left ear the hole is perfect and contains a string of white and green glass beads alternated. This would seem almost decisive in favor of the object having been a doll and not a rattle, though it may have been used for both.

Fig. 213.
POTTERY RATTLE (OR DOLL ?).
San Diego, California.
Cat. No. 19739, U.S.N.M. ¾ natural size.

Specimen, Cat. No. 165685 (U.S. N.M.) from the Pomo Indians, Mendocino County, California, is a rattle made of the scrotum of an animal, cut open and sewed together, inclosing pebbles or shot.

NORTH AMERICAN INDIANS, EAST OF THE ROCKY MOUNTAINS.

Fig. 214 represents a musical instrument of the flute or flageolet type. It is blown from the end, but is without a mouthpiece; whether always so or because of its loss is not known. It is made from the humerus of a swan, is 10 inches in length; the sound or vent hole is lateral and 2¼ inches from the upper end. The natural hollow of the bone forms the bore of the instrument, and is nearly filled with asphaltum at the vent hole, apparently for the purpose of reducing its size and giving the necessary vibrations when blown through the upper end. This asphaltum has so far deteriorated or become degraded as that the instrument will emit only an imperfect

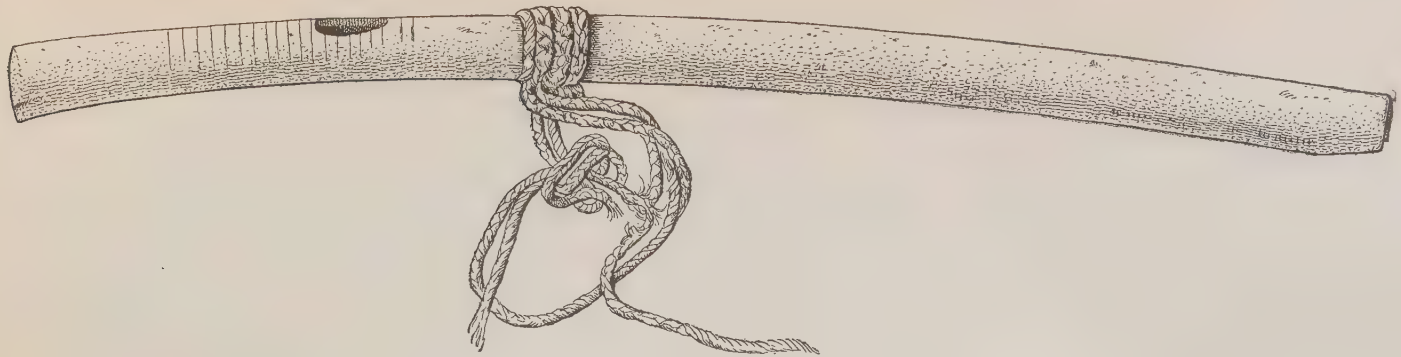


Fig. 214.
BONE WHISTLE, PONCA GRAVE (?)
Fort Randall, South Dakota.
Cat. No. 10105, U.S.N.M. $\frac{7}{10}$ natural size.

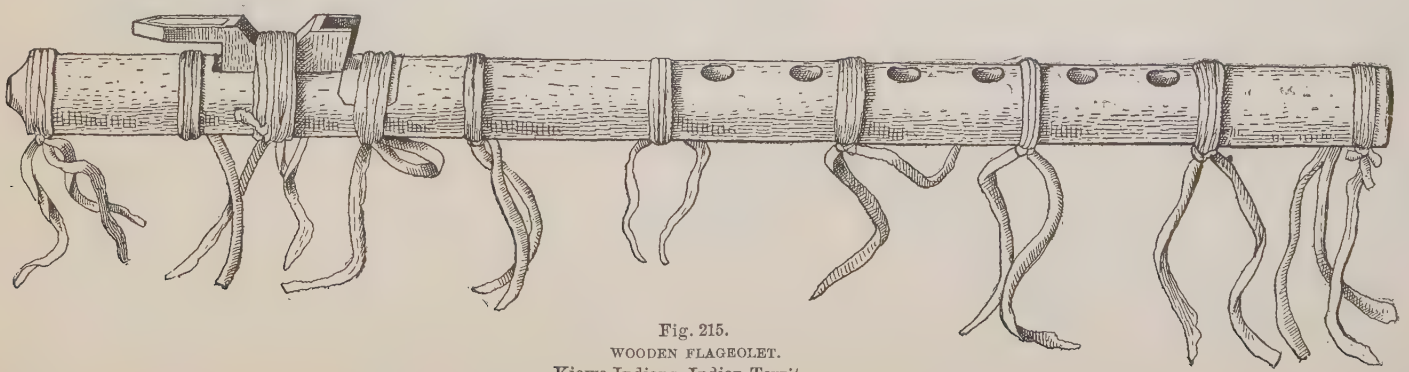


Fig. 215.
WOODEN FLAGEOLET.
Kiowa Indians, Indian Territory.
Cat. No. 153584, U.S.N.M. $\frac{7}{19}$ natural size.

note or sound when blown upon. The instrument was taken from an Indian grave at Fort Randall, and is marked as having been collected by Asst. Surg. A. J. Comfort, U. S. A.

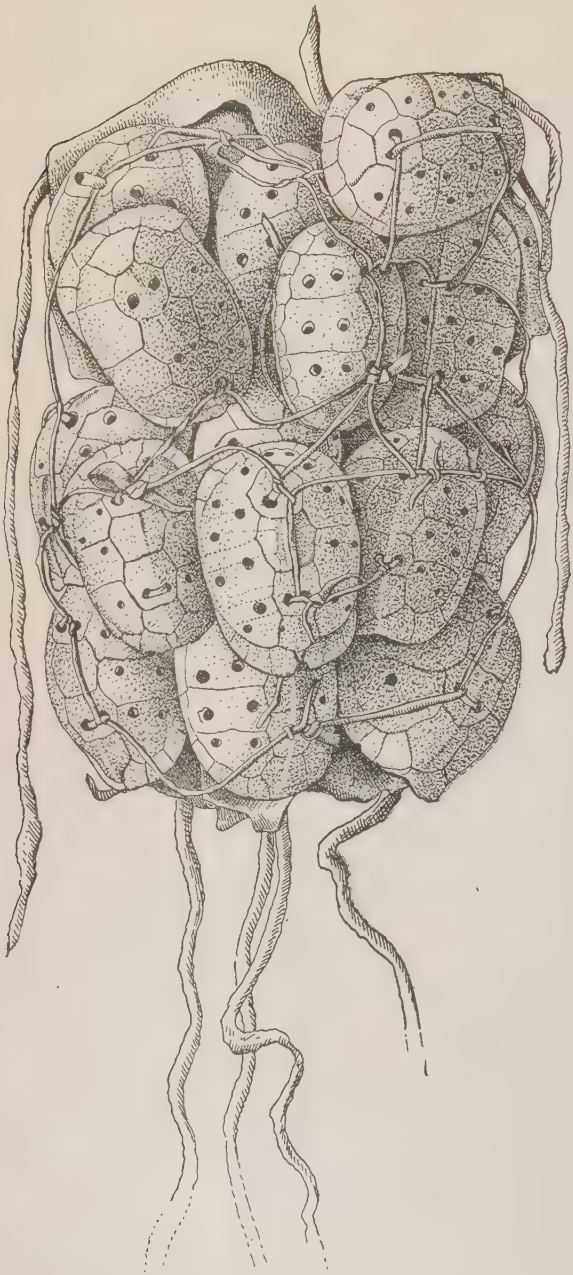


Fig. 216.

DANCE RATTLE OF TORTOISE SHELLS.

Lake Okechobee, Florida.

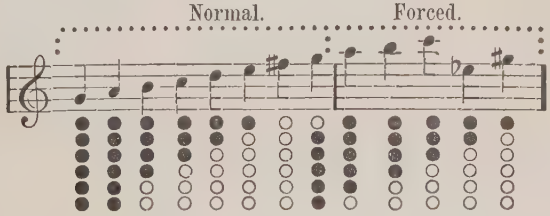
Cat. No. 15543, U.S.N.M. $\frac{3}{7}$ natural size.

Arapahoes, Mandan Sioux, Yankton Sioux, Kiowas, Seminoles.—Specimen, Cat. No. 153575 (U.S. N.M.) is an Arapaho medicine man's rattle made of skin. Its length is 9 inches. Specimen, Cat. No. 7712 (U.S.N.M.) is a rattle used by a Mandan medicine man, Dakota Territory, Fort Berthold, Upper Yellowstone River, and was collected by Drs. Gray and Matthews. Specimen, Cat. No. 8354 (U.S. N.M.) is a rattle used as a neck ornament by the Sioux Indians. It is a skeleton of a tortoise which has become mummified and has head and claws still attached. It was suspended from the neck so as to come far down on the breast, and around the low er end are bored eight small holes from wh.ch are suspended sixteen little metal strips and four diminutive copper bells, all of which

serve to make a rattling, jingling noise during the motion of the individual, presumably while in the dance.

Specimen, Cat. No. 8845 (U.S.N.M.) is a dance rattle of the Yankton Sioux. It is a stick covered with tanned buckskin, to which are attached, by leather thongs, a number of hoof tips. The end of the leather is like a sack, ornamented with bead designs and two eagle feathers. Its length, not including sack, is 17 inches.

Fig. 215 represents a flageolet of the Kiowa Indians. It is represented as having been purchased by Captain Pratt, in 1888, for the sum of $1.65. It is of cedar, has been made in halves so as to work out the interior, and is then gummed, put together, and bound tightly by ten different strands of buckskin, which serve to keep it in place. They are each wound three or four times around and tied in hard knots, except that over the vent hole, which forms a bowknot, all the ends being allowed to hang, as shown in the figure. Its length is 18 inches; its diameter, interior $\frac{3}{16}$ inch, exterior $1\frac{1}{16}$ inches. It has six finger holes put about equal distances apart and in the same relation to each other as in the white man's ordinary flageolet. The mouth hole is in the upper end and has been carved out of the solid, as represented in the figure. There is little doubt that this is a modern Indian instrument. Its scale is as follows:



The note G in the staff and the G above are a little sharp—between G and A♭. A series of notes obtained by cross fingering were only duplicates of tones already given.

Fig. 216 represents a leg rattle of the Seminole Indians. It consists of fifteen shells of the box tortoise attached to a leather legging. The shells are perforated with small holes and filled with black seeds about $\frac{3}{10}$ inch in diameter. Its length is 14 inches and width $10\frac{1}{2}$ inches.

Dr. Daniel G. Brinton, in a paper entitled "Native American stringed musical instruments,"[1] remarks:

> It is generally stated that the American Indians at the time of the discovery did not use anywhere on the continent a stringed instrument. I have found, however, four examples which seem to controvert this, and I give them in the hope that the readers in The Antiquarian will be able to add to their number.

He describes one as the "Apache fiddle," a small stringed instrument of one cord. The specimen is in the Museum of the University of Pennsylvania.

[1] American Antiquarian, January, 1897.

The resonator is a hollow reed about a foot in length, over which is stretched a strand composed of six or eight horse hairs. The strand is, at one end, wrapped around a movable crossbar, which allows it to be tightened at will. The cord is sounded by means of a bow with a horsehair string. There is some doubt whether this is a genuine aboriginal invention.

Another example is taken from Adair's History of the American Indians (p. 175), who relates that in 1746 he was among the "Mississippi-Nachee" Indians and witnessed a performance "on one of their old sacred musical instruments, * * * 5 feet long and a foot wide on the head of the board, with eight strings made out of the sinews of a large buffalo." It was played with a bow which was managed by two Indians, one at each end.

Another is the "quijongo" of Central America:

A monocord, made by fastening a wooden bow with a stretched cord over the mouth of a gourd or jar, which serves as a resonator. The bow is usually a hollow reed about 5 feet long, and the resonator is attached at one-third the distance from one end. The string is then bent down and fastened to the mouth of the jar. The notes are produced by striking the two sections of the string with a light stick, and at the same time the opening of the jar is more or less closed by the palm of the hand, thus producing a variety in the notes.

His fourth is a specimen from the Metropolitan Museum, New York, and is described as a reed about 5 feet long, with a jar fastened at the middle point, above which is a bridge. To this are attached four strings of different lengths. The specimen is labeled as from the Upper Purus River, Brazil, "Apurman Indians." But Dr. Brinton adds:

No such tribe and no such instrument are mentioned by Martius, Markham, Ehrenreich, Von den Steinen, or Polak, so I can add nothing to the information on the label.

Very nearly all interest in the foregoing as aboriginal stringed musical instruments is taken away by Dr. Brinton's last paragraph:

It is possible that in all these cases the instruments were borrowed with modifications from the whites or negroes; but there is sufficient probability that they were aboriginal American inventions to make their further study desirable. The stringed instrument sometimes found in Central America, made by stretching cords over the concave carapace of an armadillo, or turtle, must be modern, as it has no native name in either Maya or Nahuatl.

Professor Mason is sure that the aboriginal tribes of America had no stringed musical instrument whatever.

Rowbotham[1] says that the North American Indians were able to record their music by cutting notches in sticks, and he cites Schoolcraft, I, Chap. VI. He figures one of these sticks, declaring that the rise and fall of the tone necessary to produce the melody is indicated by the position of the notches, that a rising slope indicated a raise of the tone, this as they proceeded from left to right; and that a declivity of the notch or stick indicated a lowering of the tone, and that the abruptness in each case of the slope indicated the rapidity with which the rise or fall should be made. He also cites Kohl's Wanderings Around Lake Superior, pages 287–290, and Tylor's History of Mankind, page 157.

[1] History of Music, III, p. 198.

MISSOURI (MOUNDS).

Whistles (*limonite concretions*).—Certain whistles have been found, principally in Missouri, which belong to the epoch of the Mound Builders or are surely pre-Columbian.

They are limonite concretions which have been opened at one end, presumably where the crust is thinnest, the clay nucleus has been removed so as to leave a hollow interior and the opened end of the shell ground to a beveled edge, moderately sharp and thin, so that being blown against it produces a sound. The United States National Museum possesses a series of four of these.

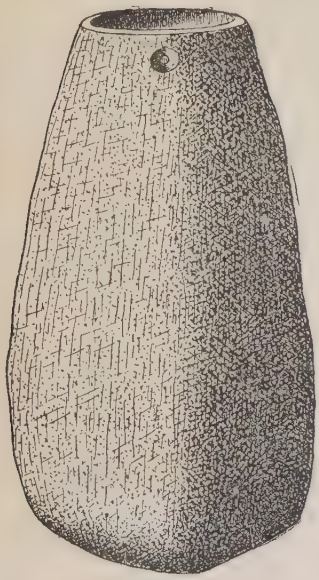


Fig. 217.

WHISTLE, LIMONITE CONCRETION.

Blackwater Creek, Saline County, Missouri.

Douglas collection, Museum of Natural History, New York. Natural size.

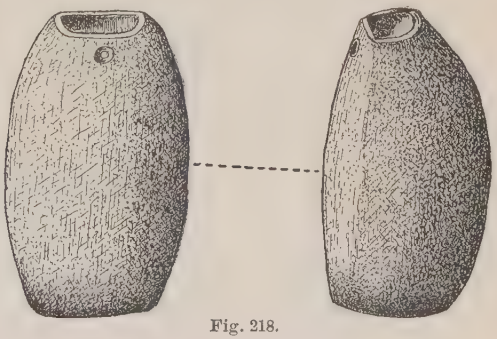


Fig. 218.

WHISTLE, LIMONITE CONCRETION.

Blackwater Creek, Saline County, Missouri.

Douglas collection, Museum of Natura. History, New York. Natural size.

A series of five belongs to the collection of Mr. A. E. Douglas, Metropolitan Museum of Natural History, Central Park, New York City. Figs. 217, 218, and 219 represent three of these. The small hole on one side near the upper end may have served for suspension as in some specimens it shows signs of wear. They are all from Blackwater Creek, Saline County, Missouri, and their musical tones or notes are, respectively, as follows:

Fig. 219.

WHISTLE, LIMONITE CONCRETION.

Blackwater Creek, Saline County, Missouri.

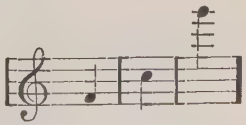
Douglas collection, Museum of Natural History, New York. Natural size.

Fig. 220.

WHISTLE, LIMONITE CONCRETION.

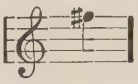
Chariton County, Missouri.

Cat. No. 62037, U.S.N.M. Natural size.



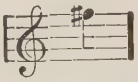
The specimens in the National Museum received from Mr. C. J. Turner are identical with the foregoing, with the exception of one which is

represented in fig. 220. Its form is somewhat like a flattened globe and its note is here given:

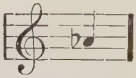


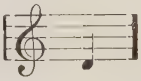
The tones emitted by the remaining specimens (not figured) are as follows:

Specimen, Cat. No. 62034 (U.S.N.M.), Chariton County, Missouri.



Specimen, Cat. No. 62035 (U.S.N.M.), Chariton County, Missouri:



Specimen, Cat. No. 62036 (U.S.N.M.), Chariton County, Missouri:

Thruston[1] figures a stone whistle of more elaborate mechanism. It is here reproduced as fig. 221. His description is as follows:

We may feel assured, however, that the aboriginal Tennesseans were not without musical instruments. The tube or whistle of dark-gray steatite, 11½ inches long, represented in fig. 190, never fails to respond in ample volume to a good pair of lungs, although not always in harmonious notes. The form of this interesting tube clearly indicates its use. It was plowed up in a field in Pleasant Cove, Warren County (Middle Tennessee), by Mr. John Blanks, and presented by him to its present owner, Dr. Thomas Black, of McMinnville, Tennessee, who kindly loaned it to the writer. The sectional view shows its interior construction, and the artistic and mechanical skill with which it is made. This fine relic appears to be unique.

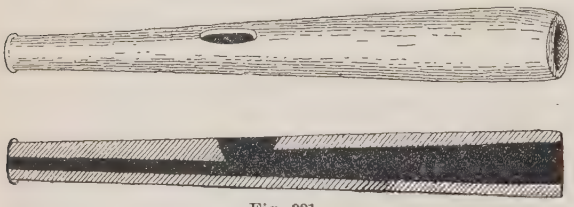


Fig. 221.

STONE WHISTLE.

Warren County, middle Tennessee.

Thruston, Antiquities of Tennessee, p. 283, fig. 190.

VIRGINIA, OHIO, TENNESSEE, ETC.

Stone tubes, possible musical instruments.—In the National Museum are a number of stone tubes of cylindrical and other forms, of different lengths. The smaller ones, often only a few inches long, have been thought to be ornaments. A variety of uses are ascribed to the

[1] Antiquities of Tennessee, p. 283.

STONE TUBES—MUSICAL INSTRUMENTS (?).

U. S. National Museum. ⅛ natural size.

EXPLANATION OF PLATE 74.

Fig. 1. From Woodstock, Vermont.
(Cat No. 10915, U. S. N. M.)

Fig. 2. From Dos Pueblos, California.
(Cat. No. 62438, U. S. N. M.)

Fig. 3. From Rockingham, Virginia.
(Cat. No. 42674, U. S. N. M.)

Fig. 4. From Virginia.
(Cat. No. 6088, U. S. N. M.)

Fig. 5. From Swanton, Vermont.
(Cat. No. 30033, U. S. N. M.)

Fig. 6. From Swanton, Vermont.
(Cat. No. 30034, U. S. N. M.)

Fig. 7. From Tennessee.
(Cat. No. 6812, U. S. N. M.)

Fig. 8. From Tennessee.
(Cat. No. 12271, U. S. N. M.)

Fig. 9. From Georgia.
(Cat. No. 31584, U. S. N. M.)

Fig. 10. From Tennessee.
(Cat. No. 34835, U. S. N. M.)

Fig. 11. From Tennessee.
(Cat. No. 27772, U. S. N. M.)

Fig. 12. From Etowah Mound, Georgia.
(Cat. No. 170858, U. S. N. M.)

larger objects, the most plausible being that by the medicine man for the pretended cure of disease. Their use for smoking or as whistles or calls has also been suggested. By proper manipulation they will emit a sound which can be heard for quite a distance, and it is possible they were used for that purpose. This remark applies to the tubes which have cylindrical holes drilled almost the entire length and then finished with one of smaller diameter (Nos. 1 to 8, plate 74), and also to the class which have biconical holes, having been drilled from both ends (Nos. 9 to 11, plate 74), and then scooped out with a tool so that the hole conforms somewhat to the outline and is smallest in the center. No. 12 shows one of this class broken before the enlarging process had been begun. These objects, if musical instruments, were not whistles but trumpets, for the sound can only be made by blowing in the same manner as are instruments of that class. The materials are usually soapstone, banded slate, and chlorite, although specimens of sandstone are not wanting.

Cylindrical tubes.

Catalogue number. U.S.N.M.	Locality.	Material.
6088	Virginia	Indurated clay.
6812	Ohio	Do.
12271	Tennessee	Do.
42674	Mound, Rockingham County, Virginia	Do.
10910	Woodstock, Vermont	Do.
30034	Swanton, Vermont (cast)	Originals, compact sandstone.
30033	-----do	Do.
30035	-----do	Do.
62438	Dos Pueblos, California	Indurated clay.

Tubes encircled in the middle with raised ring and expanding toward the ends (hourglass).

Catalogue number.	Locality.	Material.
34835	Scarboro, Anderson County, East Tennessee	Chlorite.
27772	Mound, Grassy Cove, Tennessee	Steatite.
58531	Tioga County, New York	Do. (?)
170858	Etowah Mound, Georgia	Do.

It is not at all certain that these are musical instruments, or were ever used as such, or if used it was other than sporadic or accidental. They are figured among the musical instruments for several reasons: (1) While the various uses have been suggested or surmised, no definite use has ever been discovered, and if not musical instruments, they are to be classed as unknown, or, as Dr. Rau says, enigmas; (2) they can be made to produce a sound by being blown trumpet fashion; (3) they have been claimed or classed as trumpets or horns for the making of signals or calls, as the trumpet calls of an army or encampment.

General Thruston,[1] speaking of stone tubes of hourglass form, quotes the following from Judge Haywood's History of Tennessee:

> When the stone trumpet is blown through, it makes a sound that can be heard, perhaps, 2 miles, and that probably it was used for similar purposes to those for which the trumpets of the Israelites were used, namely, principally to convene assemblies and to regulate the movements of an army.

Fig. 222.

FRAGMENTS OF WOODEN FLUTE.

Colorado.

Nordenskiöld, Cliff Dwellers of the Mesa Verde, p. 101, fig. 64.

General Thruston's experience with these tubes does not seem to have been satisfactory, for he adds:

> We have exhausted our blowing powers upon two similar "stone trumpets" in our collection without eliciting any satisfactory response in the way of music or noise, and we scarcely think it possible that these tubular objects could have been designed "for martial music," as stated.

No expression of opinion is here made as to the correctness of these claims, but we have not ignored or rejected them. To do so would be to decide the question adversely and cut off further argument. It is deemed wiser to insert the figures of these objects, calling attention to their claims as musical instruments, to the possible end that future investigators may discover something concerning their use and thus be enabled to settle the question. So far as the writer can discover in the published descriptions of these objects, their use as musical instruments is rarely advanced.

CLIFF DWELLERS.

Mr. W. H. Holmes,[2] in speaking of the pottery of the ancient Pueblos, says:

> The ancient people had not devoted their ceramic art to trivial uses; there are no toys, no rattles, and no grotesque figures.

Fig. 223.

BONE WHISTLE (?).

Colorado.

Nordenskiöld, Cliff Dwellers of the Mesa Verde, description of plate XLI.

This remark would seem to apply equally as well to the Cliff Dwellers; but that musical instruments made of other materials were not unknown to these people is evidenced by the fact that among the objects mentioned by the late G. Nordenskiöld as coming from the cliff ruins of the Mesa Verde, in southwestern Colorado, are fragments of a wooden flute and a small bone pierced with

[1] Antiquities of Tennessee, p. 282.

[2] Pottery of the Ancient Pueblos, Fourth Annual Report of the Bureau of Ethnology, 1882–83, p. 272.

a lateral hole and possibly used as a whistle. Speaking of these two objects, he says:[1]

Among the wooden objects, some fragments of a flute found in Spring House should also be mentioned. [Here reproduced as fig. 222.] The flute was made of a bough. Its diameter was 2.5 centimeters. The longest fragment measured 45 centimeters and was pierced with three holes. In a smaller fragment, which could not be fitted together with the rest, was a trace of a fourth hole.

Of the bone object he says (description of plate XLI):

The above figure [here represented in fig. 223] shows a bone implement pierced with a little hole, and perhaps used as a whistle.

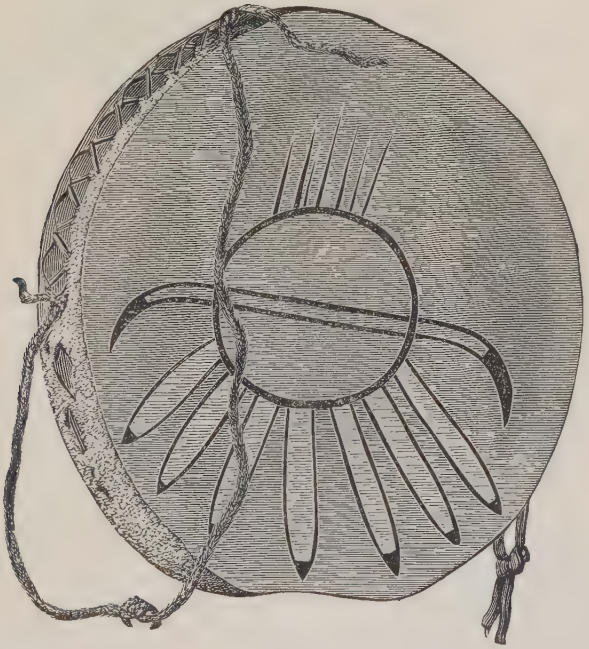


Fig. 224.

DRUM.

Pueblo Indians, New Mexico.

Cat. No. 41176, U.S.N.M. $\frac{1}{8}$ natural size.

There seems to be no reason why the use ascribed to these objects by Professor Nordenskiöld should not be accepted. A people with an art culture so highly developed in other directions might easily have invented and used musical instruments.

PUEBLO INDIANS—(ARIZONA AND NEW MEXICO).

The following descriptions of musical instruments from the Pueblos are intended merely for comparison, or for showing certain resemblances of form between them and objects of the same class from other

[1] The Cliff Dwellers of the Mesa Verde, p. 101, fig. 64.

localities. It is not claimed that they are all prehistoric, although some of them are undoubtedly ancient. Mr. James Stevenson, in his illustrated catalogue of the collections obtained from the Pueblos, says:[1]

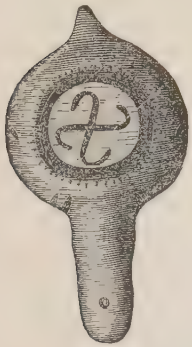


Fig. 225.
DANCE RATTLE.
Wolpi, Arizona.
Cat. No. 42042, U.S.N.M.
½ natural size.

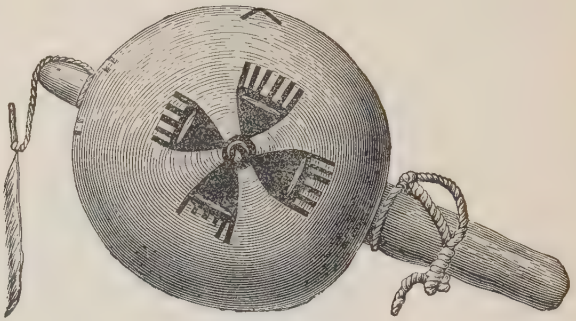


Fig. 226.
DANCE RATTLE.
Wolpi, Arizona.
Cat. No. 41862, U.S.N.M. ⅓ natural size.

Quite a number of articles of this group may perhaps be properly classed as "ancient," and were obtained more or less uninjured.

And also (pp. 335, 336) that the

ornaments and musical instruments employed in dances and religious ceremonies do not differ much among the Pueblo Indians, the principal ones being the drum, rattles made from gourds, notched sticks, a kind of flute, and a turtle-shell rattle.

Drums.—Fig. 224 represents one of these instruments. Mr. Stevenson's description (p. 398, fig. 581) is as follows:

A flat drum made by stretching goat hide over a wide hoop and tightened by lacing crosswise around the edge with a cord of the same material. One side is plain, the other is decorated with a figure which is not interpreted. This specimen is from Shinumo, but it does not differ from those used by many of the other tribes.

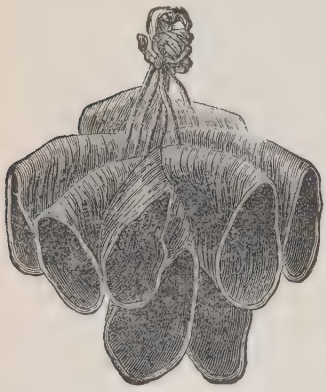


Fig. 227.
RATTLE MADE FROM OX HOOFS.
Wolpi, Arizona.
Cat. No. 41855, U.S.N.M. ⅓ natural size.

A large drum (*Pur-pi-shuk-pi-po-ya*) Cat. No. 128922 (U.S.N.M.) is of more primitive construction from the Hopi Indians of Arizona. The shell is made from an irregular shaped section of a hollow log 15¾ inches long or high and 18 inches in largest diameter. Two rawhides are stretched over the ends without hoops to make the heads, and are laced together with a strip of the same material.

[1] Second Annual Report of the Bureau of Ethnology, 1880–81, p. 319.

Rattles.—Fig. 225 represents a dance rattle from Wolpi, made from a small gourd, embellished in colors of black, red, and white. The gourd is perforated at each end, through which a stick is passed for a handle. Swastikas are painted on two sides.[1]

A primitive form of rattle (Tohi mo Mu-to-pa), Cat. No. 94006 (U.S.N.M.), is from Zuñi, New Mexico. It is the shell of a scallop or summer squash dried with the seed inside, which produce the sound. Fig. 226 represents a painted gourd rattle from Wolpi. Arizona, used in dances. It is perforated for the insertion of a wooden handle.

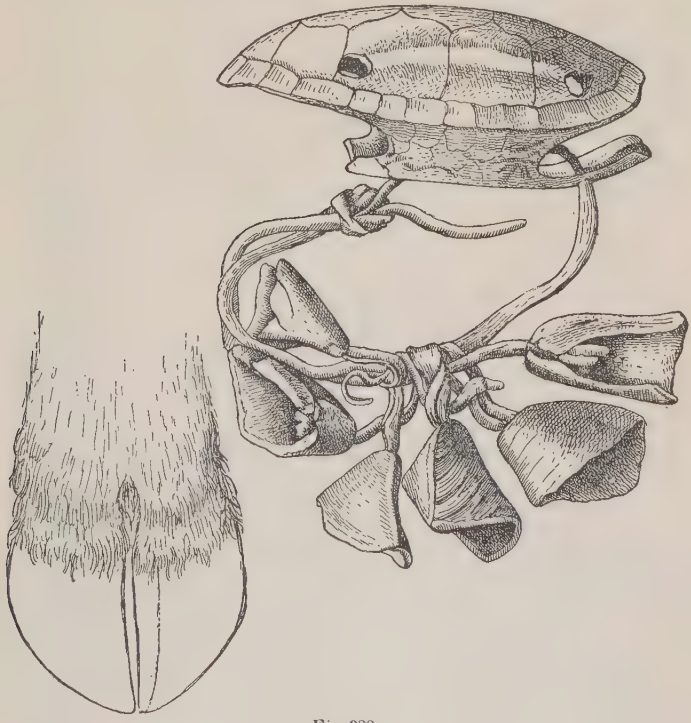


Fig. 228.

DANCE RATTLE OF TORTOISE SHELL AND DEER HOOFS.

Silla, New Mexico.

Cat. No. 47234, U.S.N.M.

A rattle made of leather in the form of a bag, inclosing pebbles, Cat. No. 47819 (U.S.N.M.), is from Silla, New Mexico. It is ornamented with feathers.

Fig. 227 represents a bunch of ox hoofs or toes, used as a rattle in dances. The objects are frequently attached to the edge of turtle shells, thereby increasing the sound. From Wolpi, Arizona.

In fig. 228 is shown a rattle made from a tortoise shell with deer hoofs attached by buckskin thongs. It is from Silla, New Mexico.

[1] Wilson, The Swastika, p. 896, fig. 256.

Fig. 229 represents another rattle of this class from Zuñi, New Mexico. Mr. Stevenson's description (p. 373) is as follows:

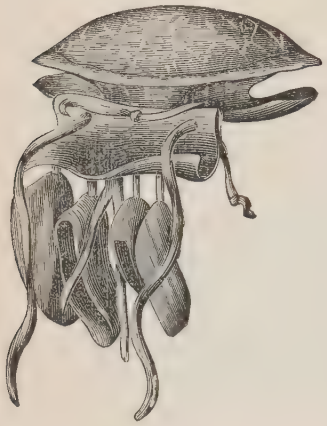


Fig. 229.
DANCE RATTLE.
Zuñi, New Mexico.
Cat. No. 41853, U.S.N.M. ½ natural size.

Specimen of a rattle or musical instrument made from the shell of a turtle, which is highly esteemed by the Pueblo tribes. The flesh of the turtle is carefully removed from the shell, leaving it hollow. To the edges of the breastplate are attached the toes of goats or sheep. These toes, coming in contact with the hollow shell, produce a peculiar sound, in keeping with the sound caused by the gourd rattles used in the same ceremony. The rattle is fastened to the rear of the right leg near the knee when employed in the dances.

Fig. 230 represents a so-called musical instrument from Hopi, Arizona. It is a stick 18½ inches long, with coarse notches on one side, across which the scapula of a deer or other animal is rubbed to produce the sound.

Fig. 230.
NOTCHED STICK (*Truh-kun-pi*).
Arizona.
Cat. No. 41982, U.S.N.M.
⅛ natural size.

Wind instruments.—The wind instruments from the Pueblo Indians here mentioned are of two classes: (1) Direct flutes or hollow tubes of wood, blown across one end; (2) instruments which have a mouthpiece, made on the same principle as the modern flageolet.

Specimen, Cat. No. 69192 (U.S.N.M.) is one of the first class (*Le-na*). It is a hollow cylinder of wood with five finger holes, three in one group and two in the other. One end of the tube is beveled from the inside, making a sharp edge, against which the air is forced when blown. From Hopi, Arizona. Length, 27¼ inches; diameter, 1¼ inches.

A sacred flute (*Shoh-Koonne*), Cat. No. 69312 (U.S.N.M.), is from Zuñi, New Mexico, and is blown in the same manner as the preceding. It is made from a slightly tapering reed, and has four finger holes arranged in pairs widely separated. On the lower end is attached a flaring rim made from a piece of gourd, upon which are painted designs in bright colors. Length, 26 inches; diameter, ⅞ inch at smaller end.

An instrument of the second class (flageolet) is shown in fig. 231. It is made from a hollow reed or cane, and has four finger holes. A piece of wood flattened on one side for an air passage

is inserted in the bore and forms the mouthpiece. To the lower end is attached a flaring rim made of a piece of gourd gayly colored. The mouthpiece is somewhat mutilated, making it impossible to obtain the scale of the instrument. It is from Zuñi, New Mexico. Length, 13 inches; diameter, 1 inch.

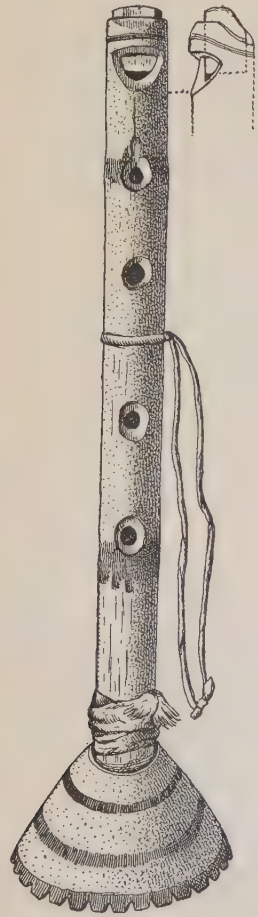


Fig. 231.
FLAGEOLET.
Zuñi, New Mexico.
Cat. No. 96479, U.S.N.M.

Fig. 232 is an instrument made of pottery, lately received by the National Museum from Mr. H. D. Thompson, of Moline, Illinois. Its remarkable similarity to specimens from Central and South America was deemed of sufficient importance to justify a description in this paper. According to Mr. Thompson, it was found several feet below the surface in the Mississippi River drift while excavating for a factory foundation. It is the only specimen of its kind found in the eastern or central United States that has thus far come to our notice. Its shape is that of an animal head (somewhat cat-like). By referring to the sketch it will be seen that the whistling mechanism is in the mouth of the animal and the eyes served as sound or finger holes. Unfortunately the mouthpiece is broken and the original scale of the instrument can not be given. Three notes, however, were possible. Pottery whistles of bird and animal shapes are frequently found in Mexico, Central and South America, as will be seen later, and the whistling apparatus in all is identical with the one here figured. Mr. Thompson (the owner) was somewhat skeptical as to the antiquity of this instrument, but the writer can only say that if it had been received from Central America its genuineness would not have been questioned, so closely does it resemble the pottery whistles from that region.

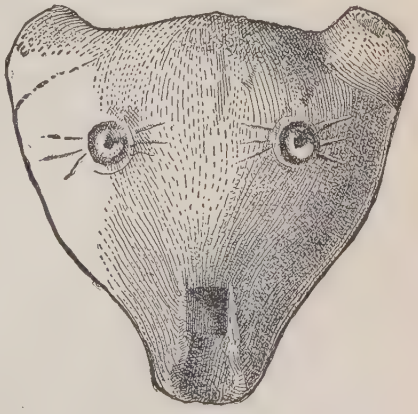


Fig. 232.
POTTERY WHISTLE.
Moline, Illinois.
Cat. No. 195269, U.S.N.M. Natural size.

Mexico.

Music evidently occupied a prominent place in the arts of the ancient Mexicans, for it is mentioned by the early Spanish writers in connection with war, religious ceremonies, and festivals of various kinds. The instruments described or mentioned were drums, timbals, flutes, horns, trumpets, and rattles. According to Clavigero,[1] they had no stringed instruments.

Of their use in war or military movements Bernal Diaz[2] relates:

> We saw the enemy in the plain in our front, advancing against us, sounding their trumpets, horns, and drums.

Again he says (p. 297):

> Before we arrived at our quarters and while the enemy were pursuing us, we heard their shrill timbals and the dismal sound of the great drum from the top of the great temple of the god of war, which overlooked the whole city.

Clavigero[3] also mentions the use of musical instruments in war:

> They began the battle (as was usual in ancient Europe and among the Romans) with a most terrible noise of warlike instruments, shouting and whistling, which struck terror to those not accustomed to hear it.

Of the religious music in charge of the priests the same author says (p. 43):

> The Ometochtli was the chief composer of the hymns which were sung at festivals; * * * the Tlapixcatzin, the master of the chapel, who not only appointed the music, but superintended the singing and corrected the singers.

Of songs and dances Don Antonio de Mendoza, in a second letter[4] to Emperor Charles V, says:

> Indians accompanying their dances and songs with flutes marked at the places where fingers are to be placed. The flutes are of different sizes. The singers beat time as with us. They sing in accord with those playing.

Prescott,[5] in speaking of the domestic manners of the Atzecs, says:

> As soon as they had finished their repast the young people rose from the table to close the festivities of the day with dancing. They danced gracefully to the sound of various instruments, accompanying their movements with chants of a pleasing, though somewhat plaintive character.

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[1] The History of Mexico, Trans. Charles Cullen, esq., Philadelphia, 1817, II, p. 207.

[2] True History of the Conquest of Mexico, Trans. Maurice Keatinge, esq., London, 1800, p. 45.

[3] The History of Mexico, p. 170.

[4] Castañeda: 1540. Relation Du Voyage De Cibola, etc., Appendice, p. 295; Trans. H. Ternaux-Compares, Paris, 1838.

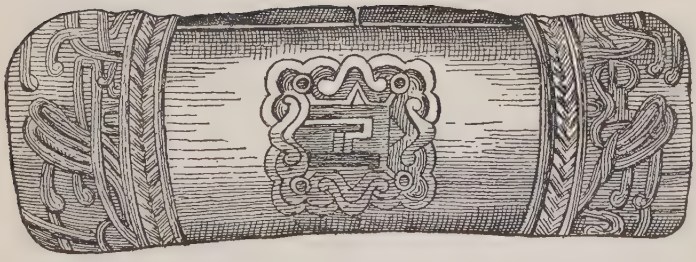
[5] Conquest of Mexico, I, p. 156.

INSTRUMENTS OF PERCUSSION.

Drums (*teponaztli*).—There is no representative of the ancient Mexican drum in the United States National Museum, and those here shown in fig. 233 *a*, *b*, are copied from the work of Carl Engel.[1] His description is as follows:

The teponaztli of the Aztecs is generally made of a single block of very hard wood, somewhat oblong square in shape, which they hollowed, leaving at each end a solid piece about 3 or 4 inches in thickness, and at its upper side a kind of sound-

a.



b.

Fig. 233.

DRUMS.

Teponaztli of the Aztecs.

Carl Engel, Descriptive Catalogue of Musical Instruments in the Kensington Museum, p. 77, fig. 65.

board, about a quarter of an inch in thickness. In this sound-board, if it may be called so, they made three incisions, namely, two running parallel some distance lengthwise of the drum, and a third running across from one of these to the other, just in the center. ⎓ By this means they obtained two vibrating tongues of wood, which, when beaten with a stick, produced sounds as clearly defined as those of our kettledrums. By making one of the tongues thinner than the other,

[1] A Descriptive Catalogue of the Musical Instruments in the Kensington Museum, p. 77, fig. 65.

they insured two different sounds, the pitch of which they were enabled to regulate by shaving off more or less wood. The bottom of the drum they cut almost entirely open. The traveler M. Nebel was told by archæologists in Mexico that these instruments always contained the interval of a third, but on examining several specimens which he saw in museums, he found some in which the two sounds stood toward each other in the relation of a fourth, while in others they constituted a fifth, in others a sixth, and in some even an octave. This is noteworthy, inasmuch as it points to a conformity with our diatonic series of intervals, excepting the seventh.

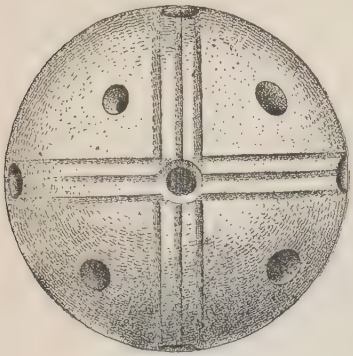


Fig. 234.
POTTERY RATTLE (*ayacachtli*).
Mexico.
Cat. No. 133206, U.S.N.M. Natural size.

The teponaztli was generally carved with fanciful and ingenious designs. It was beaten with two drumsticks covered at the end with an elastic gum called ule, which was obtained from the milky juice extracted from the Mexican ule tree. Some of these drums were so small that they used to be carried on a string or strap, suspended around the neck of the player; others, again, measured upward of 5 feet in length, and their sound was so powerful that it could be heard at a distance of 3 miles. In some rare instances a specimen of the teponaztli is still preserved by the Indians in Mexico, especially among tribes who have been comparatively but little affected by intercourse with their European aggressors.

Rattles (*ayacachtli*).—The rattle appears to have occupied an important place in the ceremonies of the ancient Mexicans. In construction it was similar to the rattles commonly used by the Indians of the present day, which are round or oval in shape and usually made of a gourd, into which is inserted a wooden handle. A number of small pebbles were inclosed in the hollowed gourd.[1]

Rattles made of pottery were also used, and there are in the Museum quite a number of these ancient instruments. Fig. 234 represents one of a series—the simplest form (Batchelor collection). It is round and the outer surface is ornamented with incised line decoration in panel-like designs. They are perforated with a number of holes, in most cases not placed with any particular regularity. The inside is furnished with small clay pellets, which produce the sound. Another form is shown in fig. 235, which is a double bell or rattle (Blake collection). Its shape is like two small gourds with the stems twisted together so as to form a handle. A straight slit divides the globular bodies almost in half, exposing the clay pellets which produce the sound. The painted decoration

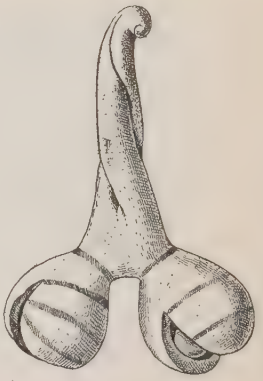


Fig. 235.
DOUBLE BELL OR RATTLE OF POTTERY. TLALTELOLCO.
Mexico.
Cat. No. 99109, U.S.N.M. ½ natural size.

[1] Engel, Musical Instruments, p. 79.

is quite simple, consisting of lines and dots in black. The sound of this rattle is clear and distinct—similar to that of metallic bells.

A recent addition to the Museum (Cat. No. 196675, U.S.N.M., Phillips collection), is a gourd-shaped rattle modeled in grayish colored clay, the neck or handle representing a grotesque human head. The globular part containing clay pellets is divided in the same manner

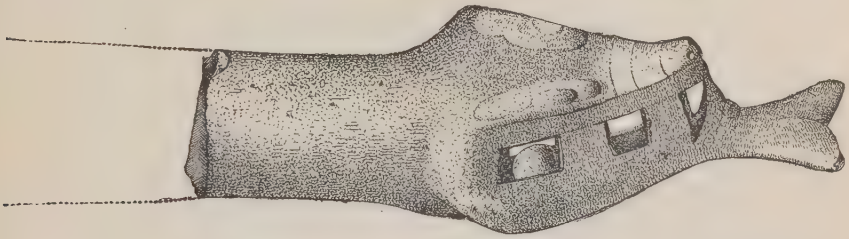


Fig. 236.

HANDLE OF INCENSE BURNER WITH RATTLE.

Hill of Tepeyac, Mexico.

Cat. No. 99082, U.S.N.M. ½ natural size.

as the preceding (fig. 235), and in addition there are two small holes placed on opposite sides of the chamber in a line transverse to the division or slit. The clay is not well baked and the sound is rather feeble.

Additional specimens of earthenware rattles in the United States National Museum not figured are as follows:

Catalogue number.	Locality.	From whom received.
27871	Valley of Mexico	National Museum of Mexico.
27872	do	Do.
133216	Mexico	Ward Batchelor.
133217	do	Do.

There are a number of broken pottery instruments or objects in the United States National Museum which at first sight were thought to have been rattles. They are in the form of a slightly tapering tube, varying in length from 2 feet to 6 inches, and in diameter from $1\frac{3}{4}$ to $1\frac{1}{2}$ inches. In some of these a serpent or reptile's head containing a clay pellet is represented at one end, as shown in fig. 236. The clay is well tempered and the sound produced quite brilliant. Recent accessions from Mexico, however, furnish evidence that the above are handles of vessels used in religious ceremonies (incense burners?), the rattle probably serving an accessory purpose. Among the objects recently found by Mr. Edward Palmer in a burial cave at Dos Caminos, 25 miles east of Acapulco, were twenty-nine fragments. Ten of these are the upper part of handles with a portion of the bowl still attached, and nineteen are the lower ends terminating in heads of reptiles. One vessel has been sufficiently restored to indicate its character, and is here

introduced as fig. 237. It is in the form of an open-work bowl, the outside being ornamented with panel-like designs in low relief. A long hollow handle projects from one side, which may have terminated with a rattle, as shown in fig. 236. The similarity of these pieces or handles to the ones already possessed by the Museum was immediately recognized, and with the bowl-shaped additions lately received their identity was established. Pictographs representing certain religious ceremonies in which are priests holding like instruments are given by Chavero.[1]

Of the use of incense burners by the Mexican priests, Clavigero[2] says:

> For incense they generally make use of copal, or some other aromatic gum, * * * The censers were commonly made of clay, but they had also censers of gold.

Instruments similar to the foregoing are in the museum of the Academy of Natural Sciences in Philadelphia.

During the explorations of prehistoric ruins at Copan, Honduras, made under the direction of the Peabody Museum of American Archæ-

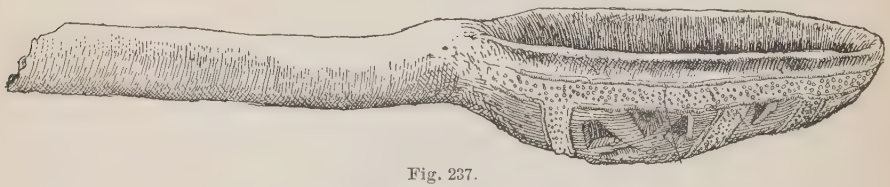


Fig. 237.

INCENSE BURNER OF POTTERY.

Burial cave, Dos Caminos near Acapulco, Mexico.

Cat. No. 173071, U.S N.M. ⅓ natural size.

ology and Ethnology, Harvard University,[3] two vessels belonging to this class were found. The report of the objects found in Tomb 6 contains the following:

> A piece of pottery 13½ inches long, in the form of a perforated ladle, the end of the handle representing the head of a serpent, was found near the skeleton. This, in all probability, is an incense burner.

And, again in Tomb 10:

> A ladle-shaped piece of pottery similar to that found in Tomb 6.

On page 30 of the same volume, in describing the contents of Tomb 1, mention is make of a pottery whistle.

A primitive form of dance rattle still used by the Yaqui Indians of Sonora, Mexico, is outlined in fig. 238. It is made of butterfly cocoons, which are divided into halves and sewed together at one end with a double cord. Each half of the cocoons contains a grain or pebble.

[1] Chavero: Mexico a través de los siglos, pp. 591–635.

[2] History of Mexico, II, p. 44.

[3] Memoirs of the Peabody Museum of American Archæology and Ethnology, Harvard University, I, No. 1, p. 32, Prehistoric Ruins of Copan, Honduras, Preliminary Report.

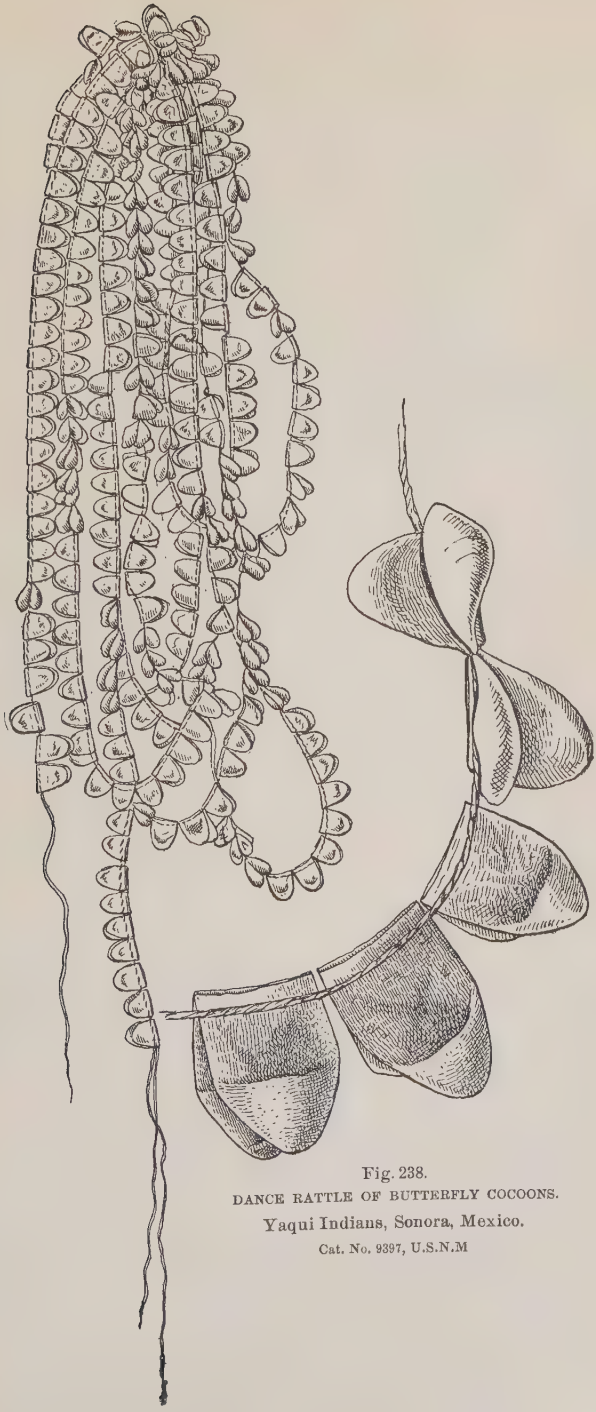


Fig. 238.
DANCE RATTLE OF BUTTERFLY COCOONS.
Yaqui Indians, Sonora, Mexico.
Cat. No. 9397, U.S.N.M

They are attached to a long cord, which is wound around the leg of the dancer.

Bells (*tzilinilli*).—The only instruments of metal in the Museum collection of Mexican antiquities are the bronze bells.(?) These appear to have been in general use by the Mexicans before the Spanish conquest, and they are often found figured in the picture writings representing the various objects which the Aztecs used to pay as tribute to their sovereigns. One of these bells is shown in fig. 239. Mr. W. H. Holmes, in "Ancient Art in the Province of Chiriqui,"[1] says:

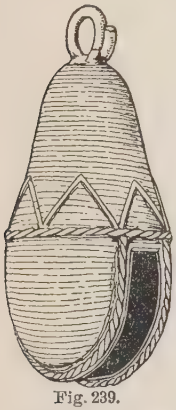


Fig. 239.

ANCIENT COPPER OR BRONZE BELL.

Mexico.

Cat. No. 99041, U.S.N.M. Natural size.

> A question as to the authenticity of these bells naturally arises, and it may be difficult to show to the satisfaction of the skeptical mind that any particular specimen is not of European origin or inspiration. At the same time we are not without strong evidences (historical and otherwise) that such bells were in use by the Americans before the advent of the whites. * * * The form originated, no doubt, in the rattle, at first a nutshell or a gourd; later it was modeled in clay. With the acknowledged skill of these people in the working of metals, there is no reason why the bells described should not have been manufactured independently of European aid and influence, provided the requisite metal was at hand. It should be observed that, if these early American bells were copied from or based upon Spanish originals, they would not vary greatly in type with the various sections from which they are recovered, but it is observed that marked and persistent differences do occur. The well-known Mexican bell, an example of which is here outlined in fig. 44 [our fig. 239], although of bronze, is generically distinct in form and construction.

Similar bells in the United States National Museum not figured are as follows:

Catalogue No.	Locality.	Number.	Collector.
97782	Orizaba, Mexico	7	L. H. Ayme.
99035	Mexico	1	W. W. Blake.
99036	do	1	Do.
99037	do	1	Do.
99038	do	1	Do.
99039	do	1	Do.
99040	do	1	Do.
99042	do	1	Do.
99043	Guerrero, Mexico	1	Do.
99044	Tenango del Valle, Mexico	1	Do.
133198	Mexico	1	Ward Batchelor.

[1] Sixth Annual Report of the Bureau of Ethnology, p. 51.

WIND INSTRUMENTS.

Whistles or flageolets (pottery).—The ancient instruments of the class which are here to be described form a most interesting series; not only those from Mexico, but the similar ones from Central and South America. They show in some degree the progress which the aborigines had made in the arts, and that a musical system, however crude, had been attained. The whistling mechanism in all is identical with that of the modern flageolet, and the only distinction that can be made between them is by classing the instruments which only emit one sound or note, as whistles, and those which have one or more finger holes, as flageolets. The simple form may have served only as calls or signals. The smaller instruments are mostly grotesque caricatures of the human face or figure or of animals or birds. The larger instruments are more like the modern flageolet. Fig. 240 represents one of the smaller class. The body of this is a short tube with one end closed. A prolongation at right angles to the tube forms the mouthpiece, and on the upper part, where the two are joined, is placed a figure representing a bird with two heads. It is modeled in grayish-colored clay, unpainted. Closing the end hole will give the lower note, when opened the higher one, as seen in the accompanying scale:

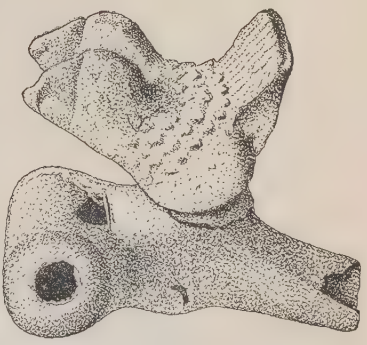


Fig. 240.
POTTERY WHISTLE, DOUBLE EAGLE.
Mexico.
Cat. No. 133213, U.S.N.M.
Natural size.

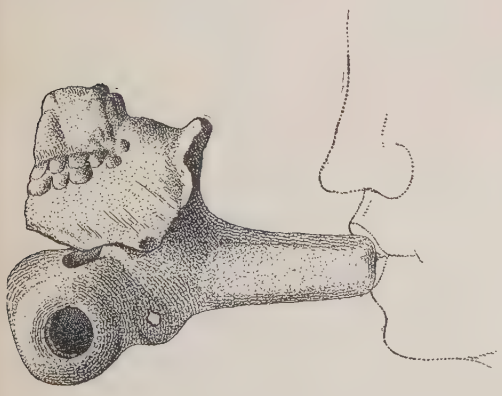
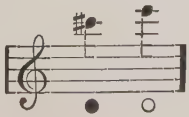


Fig. 241.
POTTERY WHISTLE, MUTILATED.
Mexico.
Cat. No. 133210, U.S.N.M.
Natural size.

Another instrument from the same locality is shown in fig. 241. It is identical in material and general shape. The ornament or figure is mutilated. Its original form was undoubtedly bird-like. The tones are here given:

Professor Kollman[1] figures and describes instruments of this and other Mexican types in a paper entitled "Flöten und Pfeifen aus Alt-Mexiko" (in the Festschrift published by Riemer in Berlin in commemoration of the seventieth birthday of Adolf Bastian.) These instruments form part of a series of Mexican antiquities belonging to the ethnographic collection in Basel. They were obtained in Mexico by Henri Lukas Vischer during the years 1828–1837. A translation, most kindly furnished by Mr. H. von Bayer, of Professor Kollman's description of the double-headed bird whistles, is as follows:

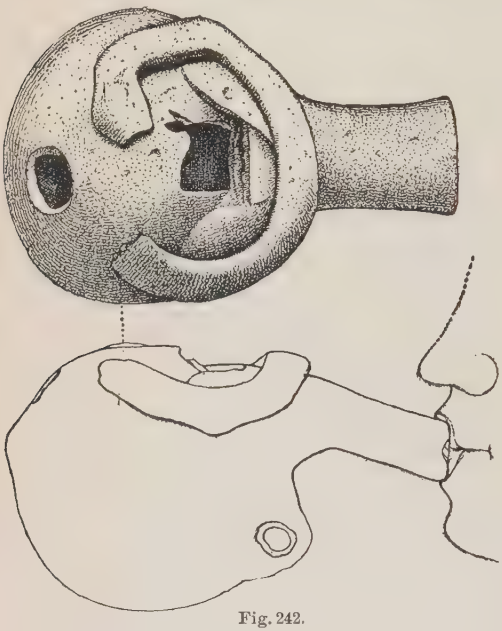


Fig. 242.

POTTERY WHISTLE, PEAR OR GOURD SHAPED.

Valley of Mexico.

Received from Museo Nacional, Mexico.

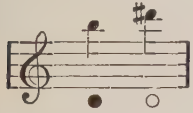
Cat. No. 27869, U.S.N.M. ½ natural size.

On the fife (fig. 4) there is an imitation of a prairie hen (*Bonasa cupido*). Another fife of our collection shows a pair of these hens united similar to the double eagle, as shown in fig. 5. The animals are represented in a live attitude; the wings are spread, the head and tail held up, as if preparing to rise. Regarding the significance of these representations, both of the single and double bird, I fail to find any clew for explanation. Perhaps it is intended to indicate the true wedded life of men or of gods, since those hens live, as is known, monogamous, as do many other species of wild fowl. Perhaps they express some motives, which render the birds so important in the minds of other peoples. This I will explain below.

Fig. 5 [our fig. 240]. A double eagle on the fife spreading the wings, with the tail raised, as if preparing for a downward flight to the earth, in contrast to the prairie hen (fig. 4), which, beyond doubt, aims to rise. The double eagle has but one body and one pair of wings; the tail, however, is quite broad and shows a slightly marked division. In neither of the two figures are the legs plainly shown, as the former are attached to the fife by a rudely formed connection of clay. The double figure has a sharply curved eagle-like beak. The entire shape of the head reminds one of the ancient Mexican representations of the white-headed eagle in Central and South America. Our collection possesses several of these figures in clay. It is therefore very probable that the pre-Columbian Mexicans connected a certain significance with a double eagle, which also became an important symbol of power with many civilized nations.

Fig. 242 represents one of a series of pear or gourd-shaped whistles,

[1] Adolf Bastian, Festschrift zum 26 Juni, 1896, p. 563.

with a tapering stem or neck, which served as a mouthpiece. It is modeled in gray-colored clay and unpainted, with the exception of the mouthpiece, which is colored dark red, and highly polished. The front portion of the instrument is ornamented in relief, and on the opposite side is a raised loop, forming a suspension hole. It has one sound hole near the base of the air chamber, and two notes are possible:

the lower tone with the sound hole closed.

The American Museum of Natural History in New York City possesses a number of pottery whistles somewhat similar to the foregoing (fig. 242). Six of these are of tolerably fine clay with the usual red painted surface, and are extremely crude representations of birds. The others, a dozen or more, were exceedingly rough, unpainted, and nearly all spherical. None of the instruments had more than one finger hole and consequently a scale of only two notes.

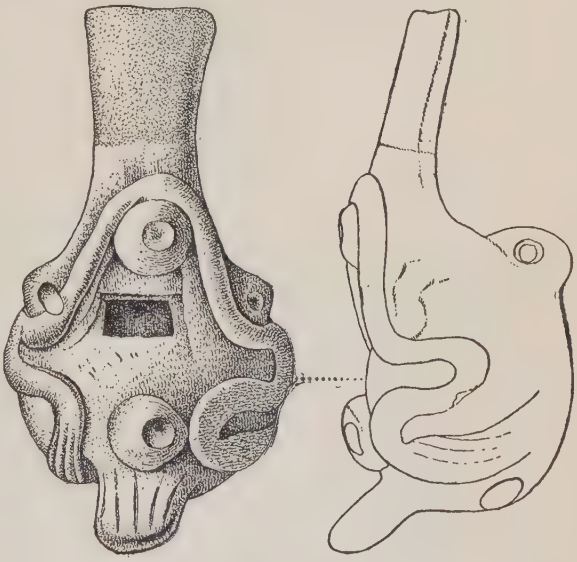


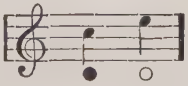
Fig. 243.

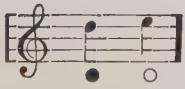
POTTERY WHISTLE, ORNAMENTED.

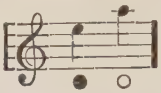
Tlaltelolco, Mexico.

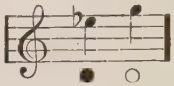
Cat. No. 99108, U.S.N.M. $\frac{1}{1}$ natural size.

Fig. 243 represents another instrument of the class, with more elaborate ornamentation. It has but one finger hole, and with the normal force in blowing the following tones are produced:



By using more force the lower note can be raised a full tone, thus:

the higher note not being affected. Specimen, Cat. No. 27870 (U.S.N.M.)

is one of the same general description. Its musical capacity is here given:

The notes given by another example belonging to this series (Cat. No. 196676, U.S.N.M., Phillips collection) are indicated in the following scale:



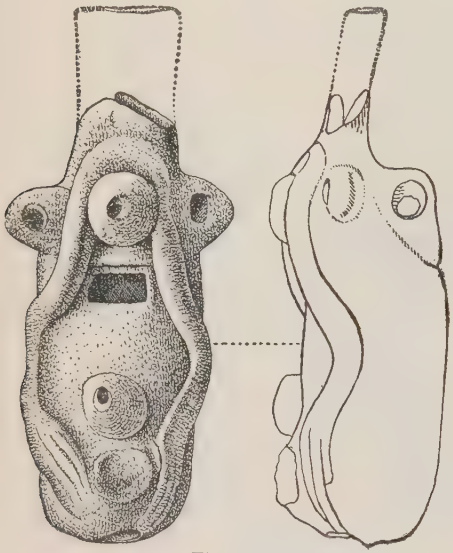
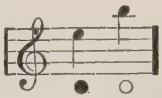


Fig. 244.

POTTERY WHISTLE, ELONGATED FORM.

Tezcuco, Mexico.

Cat. No. 99074, U.S.N.M. Natural size.

In fig. 244 is outlined a whistle of more elongated form, but in principle the same as those just described. Its two notes are as follows:

Another whistle not figured (Cat. No. 133211, U.S.N.M.) belongs to the series. It is small and without any decoration. The two notes are as follows:

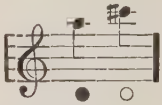



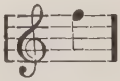
Fig. 245 represents one of the larger specimens, in the shape of a grotesque human figure. The tapering mouthpiece is missing. There is no finger hole, and its one note is here indicated:

This instrument was dug up by the Mexicans in constructing fortifications near the site of the ancient city of Tezcuco, near the close of the United States and Mexican war. Instruments of this class will be found in the Poinsett collection, Museum of the Academy of Natural Sciences, Philadelphia.

Fig. 246 represents a whistle of a highly complicated design. A better idea of its appearance can be gained by referring to the sketch than is possible from a written description. Part of the mouthpiece is wanting, but it was probably furnished with one similar to those on the whistles heretofore described, and is here indicated by dotted lines in the sketch. It is the largest whistle in the Museum collection from

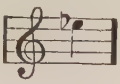
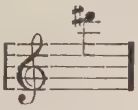
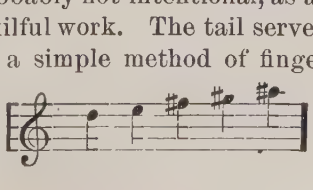
Mexico, and the volume of tone is in proportion to the size of the instrument. The note produced is here given:

In fig. 247 is shown a small whistle of unpainted black ware. It represents a grotesque human head. The neck serves as a mouthpiece and there is one sound hole placed under the chin. With the hole open no distinct tone can be made; when closed the following note is emitted:

The American Museum of Natural History in New York City has two whistles similar to the foregoing, but representing a death's head or mask.

Fig. 248 shows another whistle caricaturing the human face. (Received from Hugo Finck.) It is modeled in coarse reddish clay and not painted. The air passage is through the neck and the venthole is represented in the widely open mouth. The interior of the head, which forms the air chamber, is so filled with earth and the specimen otherwise so mutilated that no sound can be obtained. This figure is only inserted in order to show the variety of forms which occur in these instruments.

Fig. 245.
POTTERY WHISTLE.
Tezcuco, Mexico.
Cat. No. 10069, U.S.N.M. 7/8 natural size.

One example of a bird-shaped whistle (Cat. No. 196677, U.S.N.M., Phillips collection) is suggestive of the instruments so often found in Central and South America. It is roughly executed in dark gray-colored clay, unpainted. The legs and part of the head are broken and missing. There are four finger holes, two on each side of the body. These, being of unequal sizes, increase the number of sounds possible, but these differences (in size) were probably not intentional, as all the details of modeling show haste or unskilful work. The tail serves as a mouthpiece, and the notes obtained by a simple method of fingering are shown in the following scale:



Intermediate notes can be obtained by cross fingering.

Fig. 249 represents a tubular instrument of coarse red clay with a flageolet-like mouthpiece. On the upper part of the lower extremity

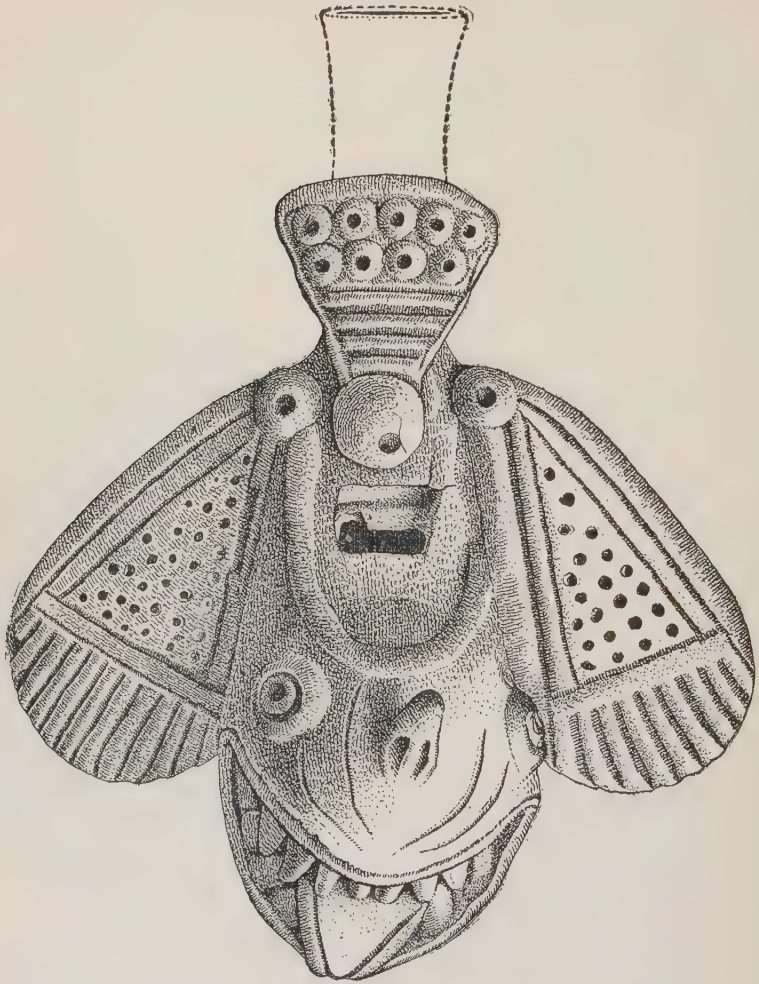


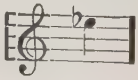
Fig. 246.

LARGE POTTERY WHISTLE, COMPLICATED DESIGN.

Excavations near Mexico by Dr. Antonio Peñafiel.

Cat. No. 10482, U.S.N.M. $\frac{4}{5}$ natural size.

(part of which is missing) is represented the head and part of the body of a serpent-like animal, but on account of weathering the features are not distinguishable. There are no finger holes, and its one note is as follows:



An instrument of the same class is shown in fig. 250. It is of like

material and from the same locality as the preceding. The ornamentation, however, is different. Attached to the upper part of the tube about midway from each end is a disk ornamented in relief. Back of this are two projecting wings, and a sort of tail curves over the end of the tube, but leaving the bore entirely open. There are no finger holes, and the whistling apparatus is so much damaged that no musical sound can be produced.

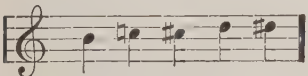
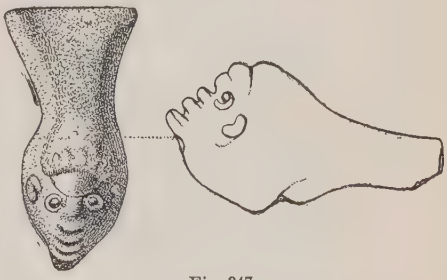
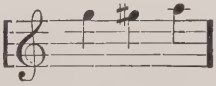
Tubular instruments with four finger holes and but little, if any, added decorations are represented in the National Museum by three specimens found by Mr. Edward Palmer while exploring a cave situated in the Hortices district about 28 miles east of Colima, Mexico. All are modeled in rather coarse reddish clay. The largest (fig. 250*a*) measures 13¼ inches in length by ¾ inch in outside diameter, the bore or inside being $\frac{9}{16}$ inch. The mouthpiece is formed by closing and flattening one end of the tube, and has the usual air passage and venthole. The finger holes are a little less than ¼ inch in diameter, and are placed ½ inch apart, the lower one being 1 inch from the end of the tube. This instrument is well preserved, but for some reason the tones emitted are weak, and can only be produced by blowing softly. The notes are as follows:



Fig. 247.

SMALL POTTERY WHISTLE, GROTESQUE HUMAN HEAD.

Tlaltelolco, Mexico.

Cat. No. 99072, U.S.N.M. ⅔ natural size.

A smaller example (Cat. No. 197172, U.S.N.M.) is the same in principle. The venthole is, however, placed on the lower side (directly reversed from its position on the large instrument), and on the opposite upper surface, extending along the tube in a line toward the finger holes, a serpent is represented in low relief. The lower end is broken off, leaving only two finger holes. The remaining part measures 8½ inches in length; outside diameter, $\frac{11}{16}$ inch, and the bore, $\frac{7}{16}$ inch. Its notes, which are round and full, are here indicated:

These are obtained by using ordinary force in blowing. Increased power will produce their octave, and, with added force, the fifth above is possible.

With the two instruments just described Mr. Palmer found a double flute or flageolet (fig. 250*b*). The tubes seem to have been made separately and then luted together. At the lower end of each are four finger holes of the same size and distance apart as given in fig. 250*a*.

The mouthpiece is broken off and missing, and whether the sounds produced were in unison or not it is impossible to determine.

The instrument represented by fig. 251 is more like the modern flageolet in shape than any in the series. The lower part is missing, but its probable outline is indicated in the sketch by the dotted lines. It is modeled of gray-colored clay, highly polished, and has band decorations in red. The long, slender mouthpiece and upper part of the cylinder containing two finger holes is all that remains. Entire, it probably had four holes, the usual number in instruments of this shape. The notes that can be produced now are as follows:

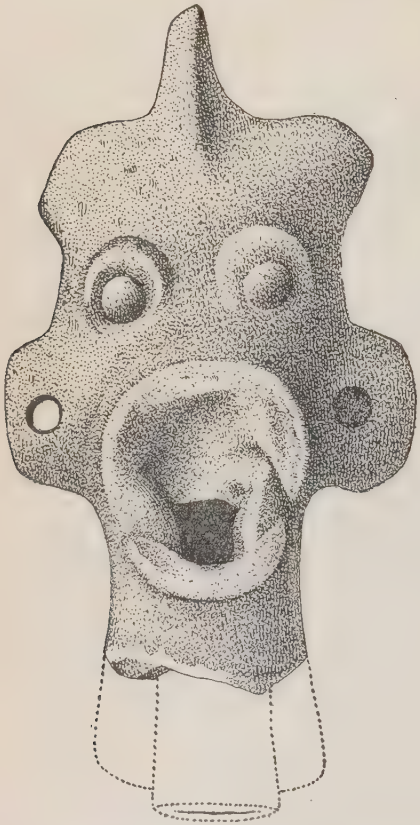
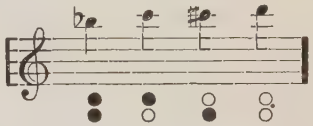
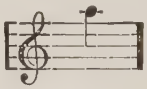


Fig. 248.

POTTERY WHISTLE, CARICATURE OF HUMAN FACE.

Ruins near Cordova, Mexico.

Cat. No. 9316, U.S.N.M. ¾ natural size.

This, of course, hardly gives an idea of the pitch and compass of the instrument originally. Specimen, Cat. No. 133212 (U.S.N.M.) evidently belongs to this class—nothing remaining, however, but the mouthpiece and enough of the cylinder to produce one note, thus:

Professor Kollman[1] describes an instrument (one of twenty-four) of this class from Mexico, deposited in the ethnographic collection in Basel. It is fig. 1 (Flöte, Çoçoloctli) of the previously mentioned paper, and a translation of his description kindly furnished by Mr. C. W. Shoemaker, of the Department of International Exchanges, Smithsonian Institution, here follows:

The bell mouth is ornamented on the outer surface (fig. 1). The ornaments are apparently done by hand. They make a neat finish, which shows a taste for regular ornamentation and an advanced technique in the working of the, in itself, somewhat ungrateful material. The ornamentation of the bell mouth is often very rich and elegant.

[1] Adolf Bastian, Festschrift zum 26 Juni, 1896, pp. 560, 561. See p. 596.

The bell mouths were painted with a white color, which now remains for the most part only in the deeper parts, but formerly probably covered the entire ornament. All the bell mouths with which I am acquainted are somewhat ornamented. In the flutes of reddish clay, the mouthpiece, almost to the wind hole, is often an intense red, and in color reminds one somewhat of terra sigillata. Neither the red nor the black color, however, is to be attributed to glazing, but to a coloring matter which was burned in.

A description of the twenty-four flutes or fragments of flutes would be superfluous in this place. They all resemble one another in a high degree. The number of the finger holes, the form of the wind hole and of the mouthpiece, is alike in all. They differ only in the color (red and black); in height, which varies from 17½ to 25½ centimeters; in the decoration of the bell mouth; and in the number of the color rings, which sometimes encircle the tubes near the finger holes.

All the flutes which have hitherto been made known from Old Mexico are not alike in form, according to letters of Mr. Seler; the flutes mentioned in the manuscript of the Biblioteca Laurenziana are formed more like oboes, so far as the mouthpiece is concerned. It is bent at an obtuse angle. These flutes have also four finger holes, but no bell mouth. The tube is rather cut diagonally at the end. For an ornament

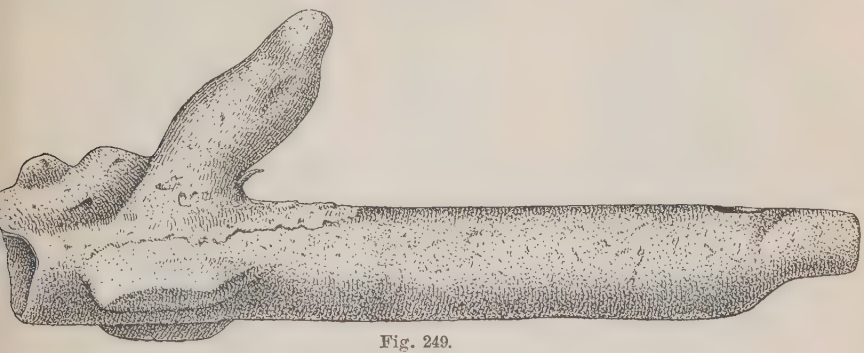


Fig. 249.

TUBE-SHAPED POTTERY WHISTLE.

Cordova, Mexico.

Cat. No. 20037, U.S.N.M. ¾ natural size.

there is a neat red patch on the tube above the finger holes, while the color of the flute appears bright yellow. From the color it is to be assumed that the flutes pictured in the Sahagun manuscript were made of reed. The red mass is doubtless the loop of riband or a small leather strap.

In the collection of Gabriel Mas, in Munich, there is a flute which has a divine figure on the front, probably Xipe the "Geschundenen."

He adds in a footnote (2, p. 559):

It is not correct to designate this instrument as a flute; flageolet would be better. A flute occurs in Europe under this name, and which is made on the same principle. But I will not quibble about the name flute, because it already occurs in literature.

We are indebted to Mr. A. E. Douglas, of New York, for the loan of a flageolet (entire) from the valley of Mexico.[1] Its shape is practically the same as outlined in fig. 251. A short description and its musical capacity are here given.

[1] This specimen was purchased by Mr. Douglas from the Boban collection of Mexican antiquities sold in New York City, December, 1886, called in the catalogue (No. 14) Uilacapitzli, and from the valley of Mexico.

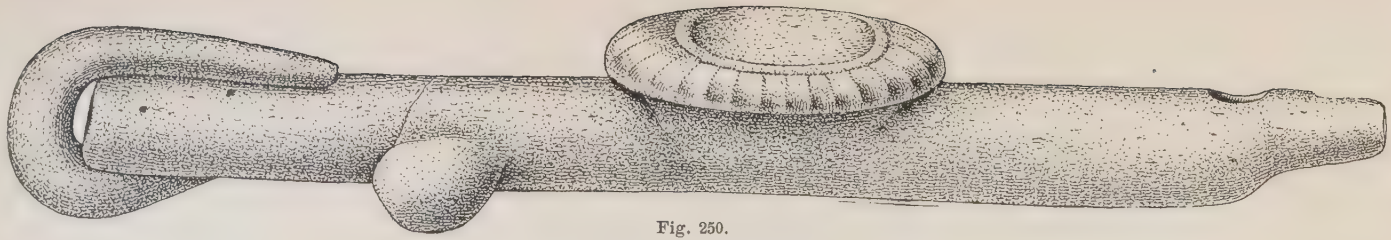


Fig. 250.

TUBE-SHAPED POTTERY WHISTLE.

Cordova, Mexico.

Cat. No. 20036, U.S.N.M. $\frac{7}{8}$ natural size.

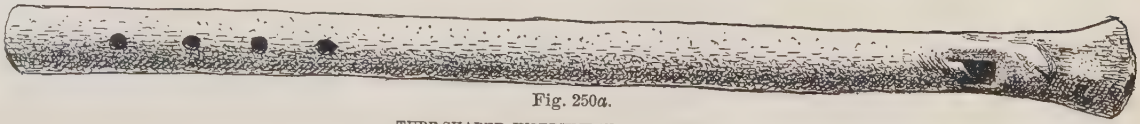


Fig. 250*a*.

TUBE-SHAPED INSTRUMENT OF POTTERY.

Colima, Mexico.

Cat. No. 197171, U.S.N.M. $\frac{2}{3}$ natural size.

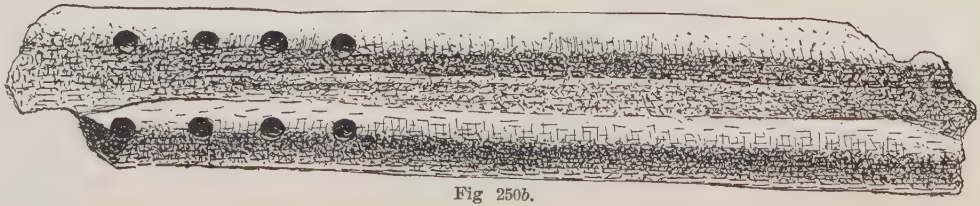
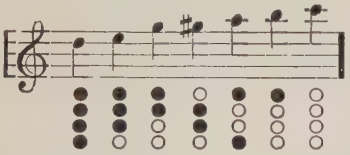
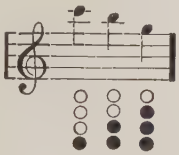
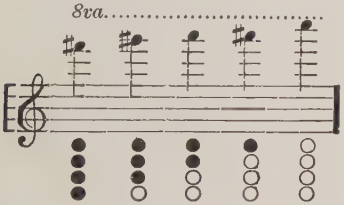
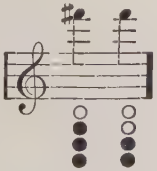


Fig 250*b*.

DOUBLE FLUTE OR FLAGEOLET OF POTTERY.

Colima, Mexico.

Cat. No. 197173, U.S.N.M. $\frac{5}{8}$ natural size.

The body of the instrument is painted dark brown and ornamented near the lower end with three bands in red. The bell (or flaring end) is not painted, but is ornamented in relief. The painted portion is highly polished. With normal force in blowing the following tones can be made; fingering as indicated in the accompanying scale:

The notes c, b, g, can also be obtained by using the following method:

With increased force the following notes are given:

The note F# can also be made by fingering thus:

It hardly seems possible that these upper notes could or would be used to any great extent as the force required to obtain them makes it almost a physical impossibility.

The Poinsett collection in the Museum of the Academy of Natural Sciences, Philadelphia, contains a

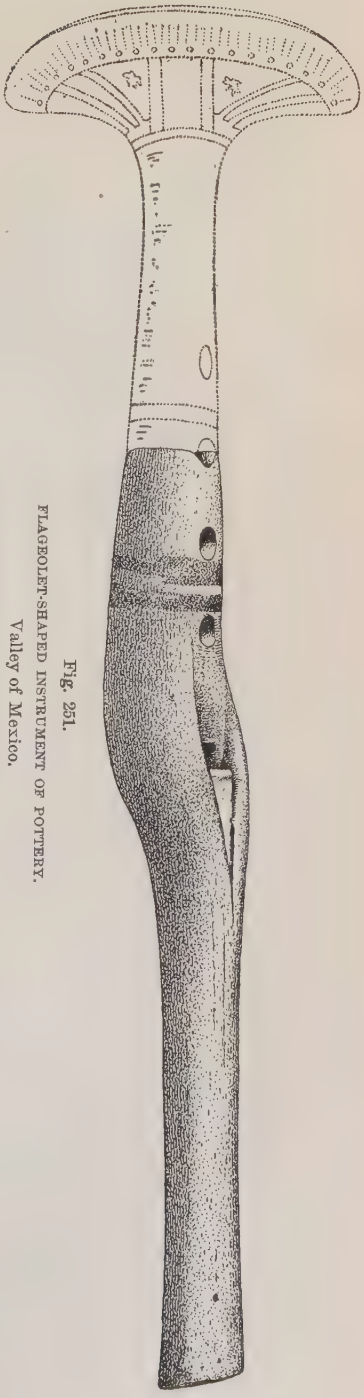


Fig. 251.

FLAGEOLET-SHAPED INSTRUMENT OF POTTERY.

Valley of Mexico.

Received from Museo Nacional. Cat. No. 2789, U.S.N.M. ⅔ natural size.

number of instruments of this class. They are of the finely polished red and black ware and have four finger holes. All are more or less broken.

In the American Museum of Natural History at Central Park, New York, I saw one of these instruments with the bell mouth and decorations similar to fig. 251 just described, and also to specimens in the South Kensington Museum figured and described by Carl Engel.[1]

But there were two others, in fragments, which, instead of ending in a bell-shaped mouth, terminated in a man's head, face or mask of the usual Mexican type. The face looked directly in front and was only slightly larger in diameter than the tube. The instrument itself was nearly a cylinder with no variations in diameter. The forehead and sides of the face were firmly attached to and formed part of the tube. The orifice or venthole for the expulsion of air is placed under the chin and corresponds to the throat.

Fig. 252 represents an instrument somewhat like those just described. It was lately presented to the Museum by Mr. Newton H. Chittenden, and is said to have been found in ancient Aztec ruins in Mexico. It is made of grayish-colored clay and painted black. The workmanship is rather rude and the clay not so well tempered as in some of the specimens before mentioned. The upper part is in the form of a grotesque human head with the tongue protruding. The headdress is quite elaborate and contains the whistling apparatus. There are two projections, one on each side of the hollow tube, which are ornamented with incised lines. The expanding bell-shaped end is decorated in relief, and with incised lines and dots. There are four finger holes, but so much of the mouthpiece is missing that its former musical capacity can not be ascertained.

The collection of Mrs. J. Crosby Brown, of New York, in the Metropolitan Museum of Art, Central Park, contains a number of instruments similar to the foregoing. They are figured in an interesting work entitled Musical Instruments and their Homes.[2] Referring to these instruments the author says in part:

> We must distinguish three different classes. The first consists of those which have been introduced by the European invaders, the second consists of the instruments of native origin now in actual use, the third class are those which have been preserved in the various mounds and pyramids of the Aztecs.

To the latter class the instruments here described undoubtedly belong.

An instrument presented by Mrs. J. Crosby Brown is shown in fig. 253. It is in the form of a reptile highly conventionalized. The body is a cylindrical tube, with the open end projecting below the neck of the reptile. At the opposite extremity the tube is enlarged somewhat to accommodate the whistling mechanism, and a tapering continuation forms the tail, which serves as a mouthpiece. There are four finger holes on the upper part or back. The lowest tone is obtained with all

[1] Musical Instruments, p. 62.

[2] Brown, Musical Instruments and their Homes, p. 311, figs. 6–9.

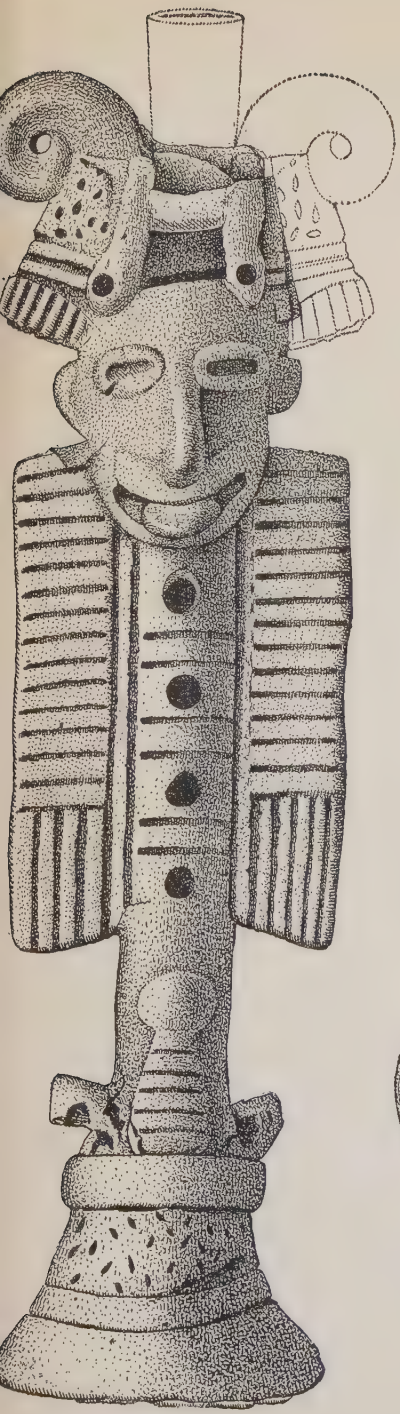


Fig. 252.
FLAGEOLET-SHAPED INSTRUMENT OF POTTERY.
Aztec ruins, Mexico.
Cat. No. 172819, U.S.N.M. ¾ natural size.

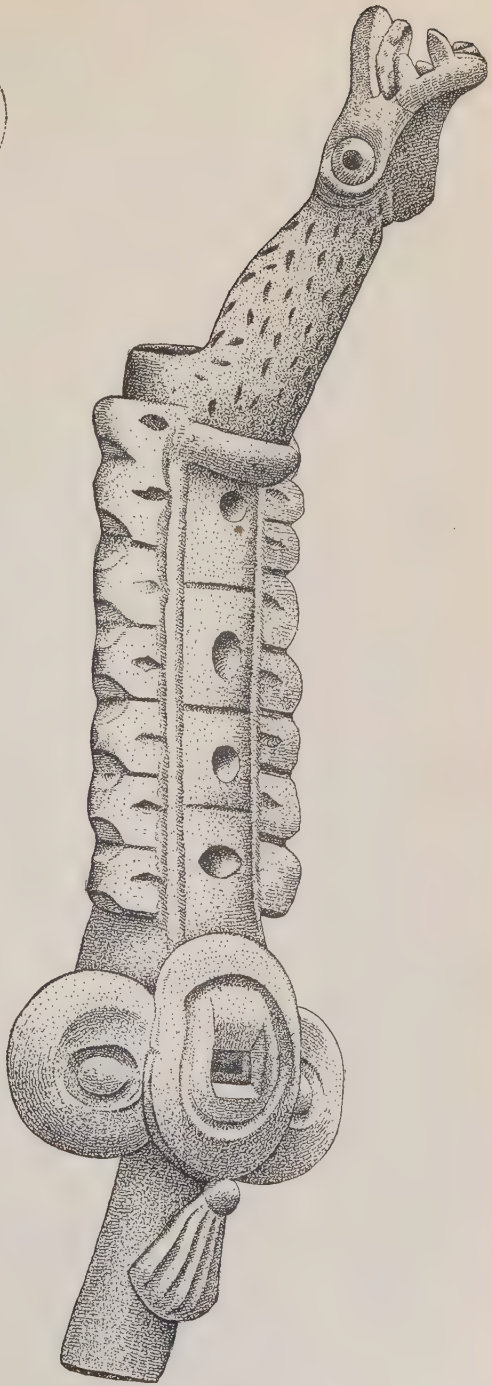
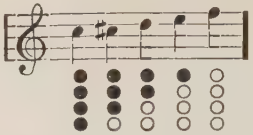
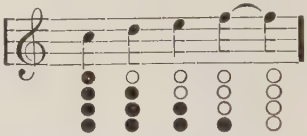


Fig. 253.
FLAGEOLET IN FORM OF REPTILE.
Mexico.
Cat. No. 93873, U.S.N.M. ⅞ natural size.

holes closed. Fingering from the open end toward the mouthpiece the following notes are emitted: Scale No. 1.



Reversing the process of fingering gives the following: Scale No. 2.



By this combination the tone F♮ is the same with all open or one hole stopped. The note C♯ can only be made by fingering, as shown in scale No. 1.

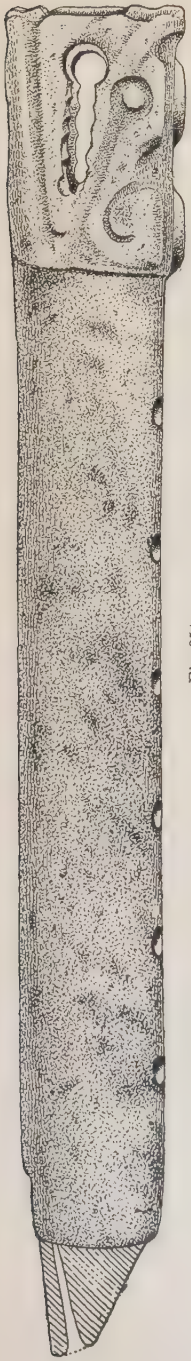


Fig. 254.
INSTRUMENT CARVED IN MARBLE.
Mexico.
Cat. No. 9898, U.S.N.M. ⅓ natural size.

Fig. 254 represents an instrument carved in marble. The upper end is broken, but was evidently fashioned for the insertion of a mouthpiece similar to the modern flageolet, a portion of the vent hole still remaining. It has six sound holes, and the lower end is carved in imitation of an alligator's head. A hastily constructed mouthpiece of wood (see restoration) was inserted by the writer, and a rather imperfect scale obtained. The antiquity of this instrument may not be very great. The fact of its having six finger holes suggests European contact, as in all other specimens of this class from the Western Hemisphere the usual number appears to have been four holes.

Prehistoric musical instruments made of wood are extremely rare. A material which decays so easily can not resist the influences of time, except under favorable conditions which retard its destruction. The wooden objects in the National Museum classed as prehistoric were all obtained from burial places, either in caves or graves.

Fig. 255 represents a whistle made from a hollow reed or cane. It was found in a prehistoric cavern near the Bay of Angeles, Lower California. One end is closed with resin and forms an air chamber. About 3 inches from the open end, which served as a mouthpiece, is a joint or knot in the

reed. At this point the tube is scooped out, leaving the natural barrier or division exposed. This formed a stop, which deflected the current of air (when blown into the open end) in the same manner as does the transverse ridge of asphaltum in the bone whistles from California heretofore described (p. 567). The outer surface is ornamented with incised bands and dots, which appear to have been burnt in. The specimen is so much weathered that no definite sound is emitted. A smaller whistle from the same cavern differs only in having both ends open. The lateral hole is at the joint, as in the foregoing. These instruments are a part of a collection obtained by Mr. Edward Palmer, who made the exploration in 1887.[1]

A flageolet, obtained from the Yaqui Indians of Sonora, Mexico, is shown in fig. 256. It is made of cane, strengthened with bands of sinew. There are three sound holes, two on the upper surface near the lower end, and one below (which does not show in the drawing), placed between the third and fourth bands from the lower end. Length, $21\frac{3}{4}$ inches. A wooden plug cut away on one side so as to leave an air passage was inserted at the upper end and formed the mouthpiece.

Fig. 255.

WHISTLE MADE FROM HOLLOW REED.

Cavern, Bay of Angels, Lower California.

Cat. No. 139588, U.S.N.M. $\frac{3}{5}$ natural size.

During the progress of this paper, Mr. Wilson, profiting by his attendance as Commissioner General of the United States at the Brussels International Exposition, 1897, visited the extensive Musée Instrumental of the Conservatory of Music of Brussels. Its curator, M. Mahillon, himself a musical-instrument maker, having devoted much time, labor and money to its successful accomplishment, has united the musical instruments of all nations. He has prepared an analytic and descriptive catalogue of the instruments under his charge, which greatly increases the value of the collection. The policy of the Belgian Government has been to invoke for the benefit of the Museum the aid of its foreign representatives in the procuration of local instruments, whether primitive or modern. As a result, it has been, through the good offices of M. Dorenberg, Belgian consul at Puebla, Mexico, the fortunate recipient of a collection of Mexican instruments, all of which are primitive, but quite a number prehistoric. These include the *Toponaztli* (Spanish *Atabal*) or drum, the *Marimba*, and the *Chirimia* (a sort of hautboy), and are said to be used together forming a primitive band. Along with these is a series, twenty-five, more or less, of whistles or flageolets similar to those heretofore represented. They figure in the Museum catalogue as Nos. 819–821, 832–856, inclusive. Most of them are apparently without holes and give but a single note which is remark-

[1] Report U. S. Nat. Mus., 1888, p. 127.

able for its high pitch, Nos. 848, 849 especially so, being F, two octaves above the staff.

Fig. 256.
FLAGEOLET MADE FROM HOLLOW REED OR CANE.
Sonora, Mexico.
Cat. No. 152985, U.S.N.M. ½ natural size.

No. 832 has four holes and sounds five notes, from G flat to C above the staff. Nos. 852, 853 have a somewhat large and indefinitely oval shape, each with four holes and sounding five notes, the former from C to A flat, and the latter from C to B sharp, both above the staff. No. 855 is a vase ornamented with relief representing the figures of men and animals. Around the neck of the vase, attached to, and forming part of the body, with the other ornamentation, are six whistles or flageolets, the mouth hole in each making its appearance on the inner edge of the neck. None of these have finger holes, and each gives but a single note, varying between A and B flat above the staff. No. 838 is a flageolet representing a salamander or alligator similar to fig. 253. It has six holes, the two lower ones of which make no variation in the pitch. The scale of the instrument runs from C to G sharp within the staff.

Central America.

San Salvador.

Whistles.—Only a few musical instruments from San Salvador, Central America, are represented in the Museum collection. In fig. 257 is shown a pottery whistle of unpainted ware in the shape of an animal head. There are no sound holes, and only one note is emitted:

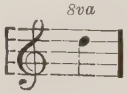
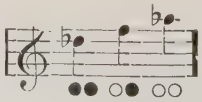



Fig. 258 represents a front and profile view of a whistle, also unpainted, from the same locality. It has a bird-shaped body with grotesque human or animal head. All the features are rudely executed. The tail serves as a mouthpiece, and there are two sound holes in the breast. Its three notes are as follows:



Specimen, Cat. No. 9642 (U.S.N.M.), is a whistle in the shape of an animal head. The mouthpiece is broken and a pure tone cannot be obtained.[1]

[1] The three specimens from San Salvador were received from Capt. J. M. Dow.

NICARAGUA.

Whistles or flageolets.—There are in the Museum a number of pottery whistles or flageolets from various localities in Nicaragua, collected by Dr. J. F. Bransford and Dr. Earl Flint, of the United States Navy, and also others lately received from the Nicaraguan Government. The latter are part of the Government collection exhibited at the Columbian Historical Exposition held at Madrid in 1892.

Fig. 257.
POTTERY WHISTLE—ANIMAL HEAD.
San Salvador.
Cat. No. 9643, U.S.N.M. ¾ natural size.

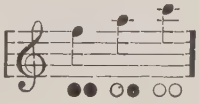
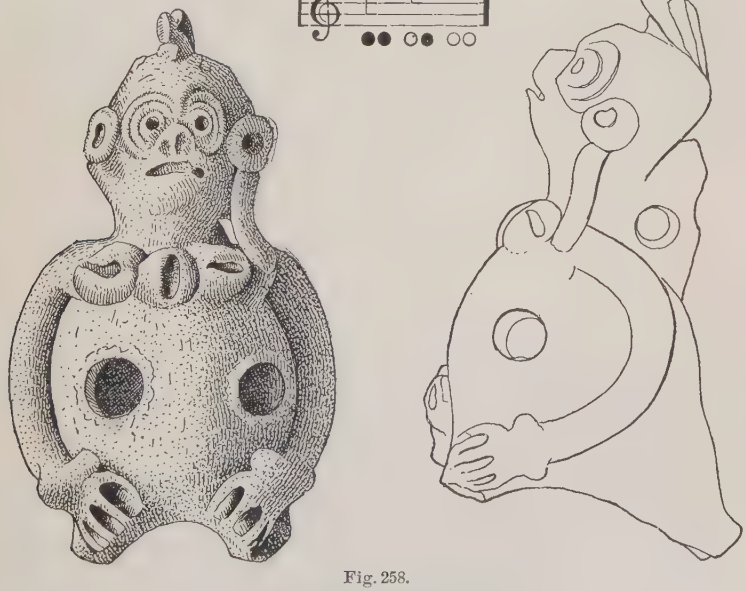
Fig. 259 represents a grotesque bird-shaped whistle of black ware from Ometepe Island, Lake Nicaragua. It is part of a collection made by Dr. J. F. Bransford in Nicaragua and described by him in "Archæological Researches in Nicaragua."[1] There are two finger holes in the back and the head serves as a mouthpiece. A raised fillet forms a loophole for suspension. Its three notes are as follows:



Fig. 258.
POTTERY WHISTLE—GROTESQUE.
Front and profile.
San Salvador.
Cat. No. 9658, U.S.N.M. Natural size.

Specimen, Cat. No. 28886 (U.S.N.M.), collected by Dr. Bransford

[1] Smithsonian Institution Contributions to Knowledge, XXV, p. 44.

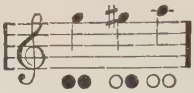
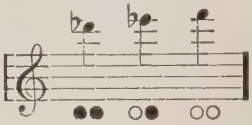
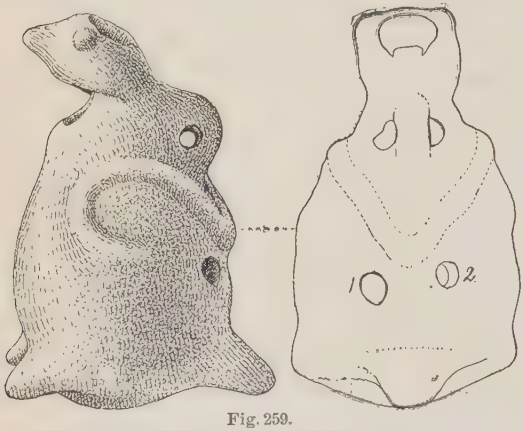
from the same locality, represents the head of an animal. There are two finger holes in the top of the head and a long pointed nose serves as a mouthpiece.[1] The notes emitted, which are strong and full, are here indicated:

Specimen, Cat. No. 32768 (U.S.N.M.), also from Ometepe Island, is a small bird-shaped whistle of gray-colored clay, unpainted. The tail serves as a mouthpiece, as is usual in bird-shaped whistles, and there are two sound holes, one on each side of the breast. The neck is pierced for suspension. Its three notes are as follows:



Fig. 259.

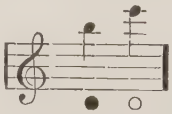
POTTERY WHISTLE—BIRD-SHAPED.

Front and profile.

Ometepe Island, Nicaragua.

Cat. No. 23759, U.S.N.M. Natural size.

Specimen, Cat. No. 48067 (U.S.N.M.), from Zapatera Island, Lake Nicaragua, was received from Dr. Earl Flint. It is a small bird-shaped whistle of polished black ware, with one sound hole in the breast. Its two notes are as follows:



Specimen, Cat. No. 172036 (U.S.N.M.), from Alta Gracia, Nicaragua, is a whistle of black polished ware in the form of a sphere. There are two sound holes, and the decorations are in relief. The mouthpiece is missing. Received from the Government of Nicaragua.

Specimen, Cat. No. 172035 (U.S.N.M.) is a whistle from the same locality, of the same material, and formed by uniting two spheres. Mutilated. Received from the Government of Nicaragua.

Fig. 260 represents a capricious piece from Moyogalpa that was evidently intended for a whistle, although it is so much mutilated that no sounds can be obtained. It is formed of three spheres arranged trian-

[1] In all of the instruments with two sound holes, unless otherwise stated, the tone or note is the same, no matter which hole is stopped.

gularly and united by two fantastic animals. Received from the Government of Nicaragua.

Specimen, Cat. No. 172038 (U.S.N.M.) is from Nicaragua, but the exact locality is not given. It is of polished black ware in the form of a tortoise. There are two sound holes in the back and the tail served as a mouthpiece. The air passage is broken, and a correct tone is impossible.

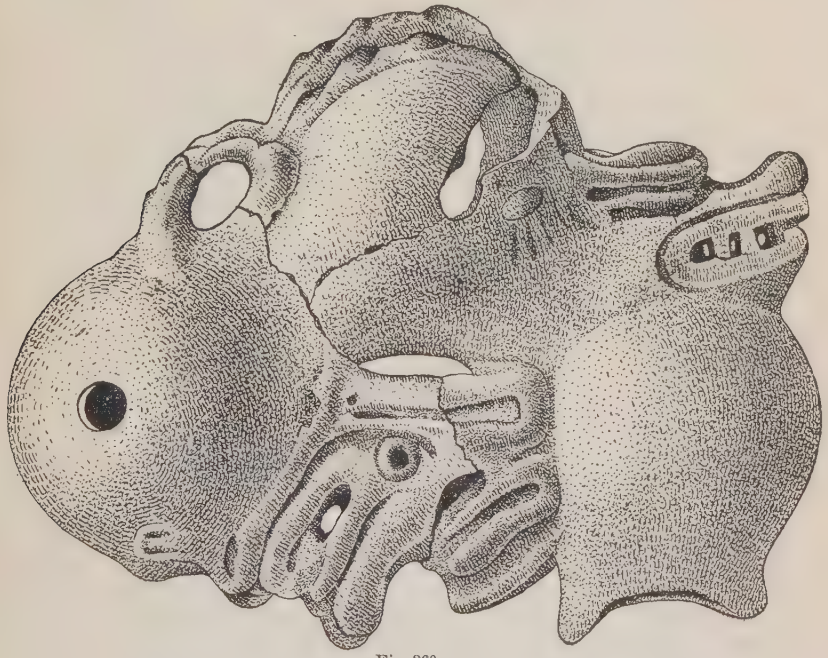


Fig. 260.

POTTERY WHISTLE—CAPRICIOUS PIECE.

Moyogalpa, Nicaragua.

Received from Government of Nicaragua.

Cat. No. 172014, U.S.N.M. $\frac{7}{10}$ natural size.

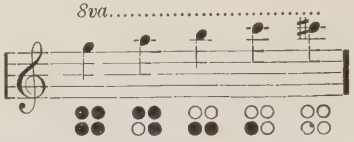
COSTA RICA.

Musical instruments of percussion are wanting in the museum collection of prehistoric objects from Costa Rica, neither drums or rattles being represented. There is no reason to suppose, however, that none existed. Their immediate neighbors to the south (Chiriqui) have furnished numerous examples of both drum and rattle. Mr. W. H. Holmes, in speaking of the ancient art of Chiriqui,[1] says:

So far as the art of pottery has come within my observation, it appears to indicate a somewhat closer relationship with the ancient Costa Rican peoples than with those of continental South America.

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 15.

Whistles or flageolets.—The instruments now to be described have the same relationship as regards form and musical capacity. Fig. 261 represents a small bird-shaped whistle of gray-colored clay, unpainted, from Acientio. There are four sound holes in the back and, as usual in instruments of this class, the tail serves as a mouthpiece. The following notes can be produced:



It will be noticed that the sound holes in the sketch are numbered 1, 2, 3, 4. The notes obtained by different combinations are here indicated:

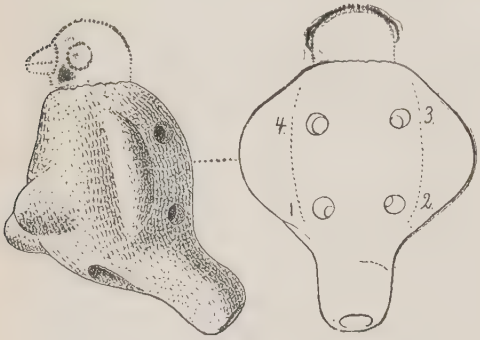


Fig. 261.

POTTERY WHISTLE—BIRD-SHAPED.

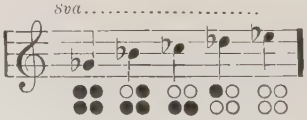
Front and profile.

Acientio, Costa Rica.

Cat. No. 28957, U.S.N.M. Natural size.

Finger holes all closed	G
Nos. 1, 2, 3, or 4, open	A
Nos. 1, 2	
2, 3	
3, 4	
4, 1	Open — B
1, 3	
4, 2	
Nos. 1, 2, 3, or 4, closed	C
Finger holes all open	C♯

Specimen, Cat. No. 28954 (U.S.N.M), from Las Canas, collected by Drs. Flint and Bransford, represents a fish. The material is dark clay, with a coating of gray color, slightly polished. Its eyes are protruding, and on the back is a group of seven nodes, six arranged in a circle, with one in the center. The scales are imitated by marks made with the finger nail. The tail serves as a mouthpiece, and there are four sound holes, two on each side. Its five notes are as follows:



The lowest note is obtained with all holes closed, the highest with all open. The remaining intervals are the same, no matter which of the one, two, or three holes are opened.

Specimen, Cat. No. 60043 (U.S.N.M.) is from Nicoya, collected by Dr. Bransford. It is bird-shaped, with the legs and wings indicated in low relief. There are four finger holes on the back, two on each side

just above the wings. The head is missing, and when broken off, it carried away part of the air chamber, making it impossible to obtain a correct note. The surface is slightly polished.

Fig. 262 represents a bird-shaped instrument from Nicoya, collected by Drs. Flint and Bransford. It is of reddish brown clay. The decoration consists of deeply incised lines on the breast, back, and wings,

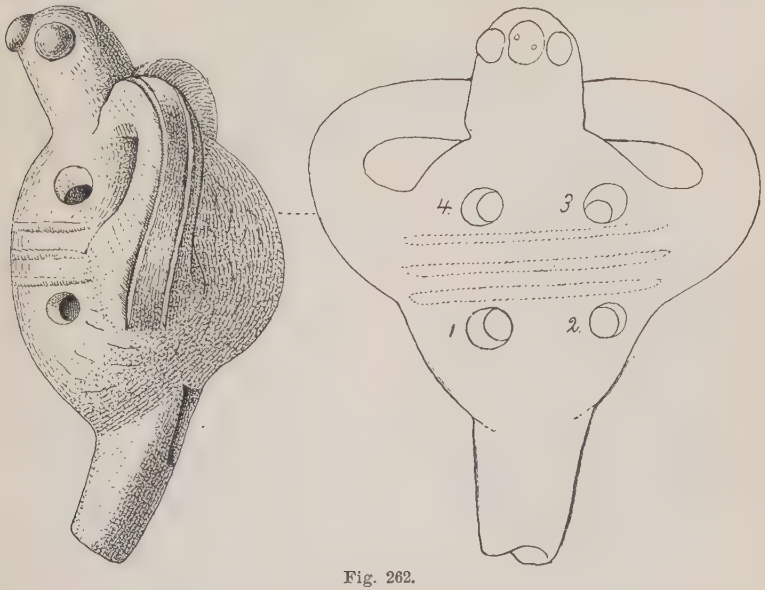


Fig. 262.

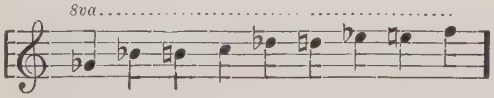
POTTERY WHISTLE—BIRD-SHAPED.

Front and profile.

Nicoya, Costa Rica.

Cat. No. 28952, U.S.N.M. Natural size.

the intervening spaces being highly polished. The remaining surface is roughly etched with zigzag lines. This work has evidently been done after the hardening of the clay. There are four finger holes on the breast, two above and two below the line decoration. The following scale indicates its musical capacity:



To make this intelligible the finger holes are numbered in the sketch and a system of fingering is here given showing the combination by which different notes are obtained:

Finger holes all closed	G♭
Nos. 1 or 2, open	B♭
Nos. 3 or 4, open	B♮
Nos. 1 and 2 open	C♮

Nos. 2 and 3 or Nos. 1 and 4 open	D♭
Nos. 4 and 2 or Nos. 1 and 3 closed	D♭
Nos. 3 and 4, open	D♮
Nos. 4 or 3, closed	E♭
Nos. 1 or 2, closed	E♮
Finger holes all open	F♮

This scale is made possible by the unequal size of the finger holes, which may be due to weathering or other causes.

Fig. 263 represents a bird-shaped instrument of dark brown clay. It also is from Nicoya, and collected by Dr. Bransford. This is one of

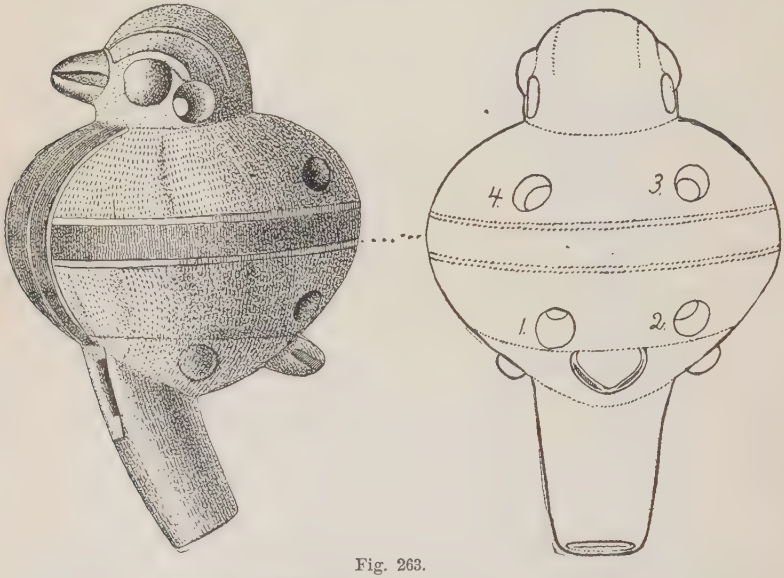


Fig. 263.

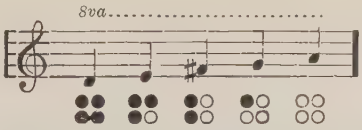
POTTERY WHISTLE—BIRD-SHAPED.

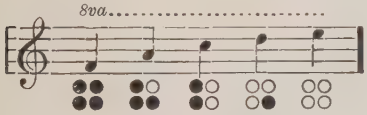
Front and profile.

Nicoya, Costa Rica.

Cat. No. 59969, U.S.N.M. ½ natural size.

the best representatives from Costa Rica in the Museum, both as regards artistic skill in the manufacture and the purity of musical tones which it is capable of giving. Its shape is conventional, being somewhat top-like, with a bird's head placed on the upper part, the opposite extremity (upon which the feet are slightly indicated) being prolonged for a mouthpiece. Upon the breast, extending from the neck to the lower part of the body, are panel-like designs, indicated by deeply incised lines. Connecting with these, and passing around the largest circumference, is a narrow band, outlined in the same manner. The remaining portion of the body has the appearance of being stippled with a comb-like instrument, producing zigzag dotted lines, which are placed with some degree of regularity. The panels, band decoration,

and mouthpiece are highly polished. A suspension hole passes through the head. It has four finger holes on the back, two above and two below the band. Its five notes are as follows:

The lowest note is obtained with all holes closed; the succeeding intervals are the same by any combination of the remaining one, two, or three holes opened.

The preceding description with two exceptions applies to specimen, Cat. No. 59970 (U.S.N.M.), from the same locality. In this one the lower part is more simple in construction, having no indication of feet or tail, and the musical tones are differently pitched, as will be seen in the accompanying scale:

Specimen, Cat. No. 28953 (U.S.N.M.) is from Nicoya, collected by Drs. Flint and Bransford. It is bird-shaped and belongs to the same class as fig. 263. The specimen is so mutilated that no sound can be obtained.

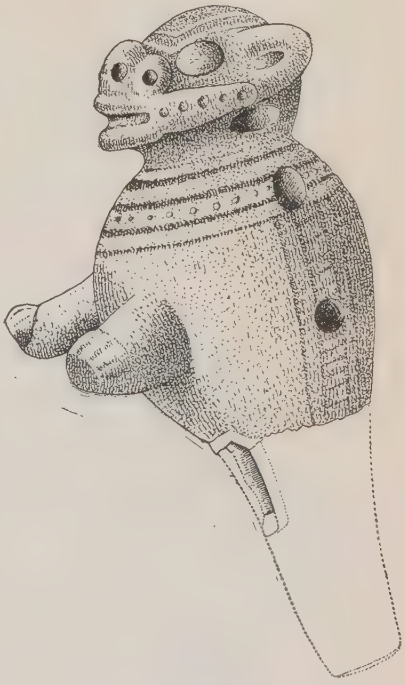


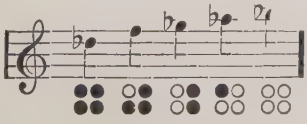
Fig. 264.

POTTERY WHISTLE—GROTESQUE FORM.

Sardinal, Nicoya, Costa Rica.

Cat. No. 60044, U.S.N.M. Natural size.

Fig. 264 represents a whistle in grotesque form. It has a bird-shaped body with the head and fore feet of a cat-like animal. The body decoration consists of incised lines and dots in geometric patterns. The tail, which served as a mouthpiece, being lost, its musical properties are unknown. It is from Nicoya and was collected by Dr. Bransford.

Specimen, Cat. No. 60045 (U.S.N.M.) is a pear-shaped whistle from the same locality as the preceding number. The material is red clay, slightly polished. There are incised line panel-like designs on two sides. It has four sound holes and the notes emitted are:

The two lower notes only are clear.

In fig. 265 is shown an instrument from Nicoya in the form of a grotesque human head. The painted decorations are in brown and red on yellow ground. The slightly protruding eyes are outlined with a narrow stripe of brown, and the entire back of the head is covered with a

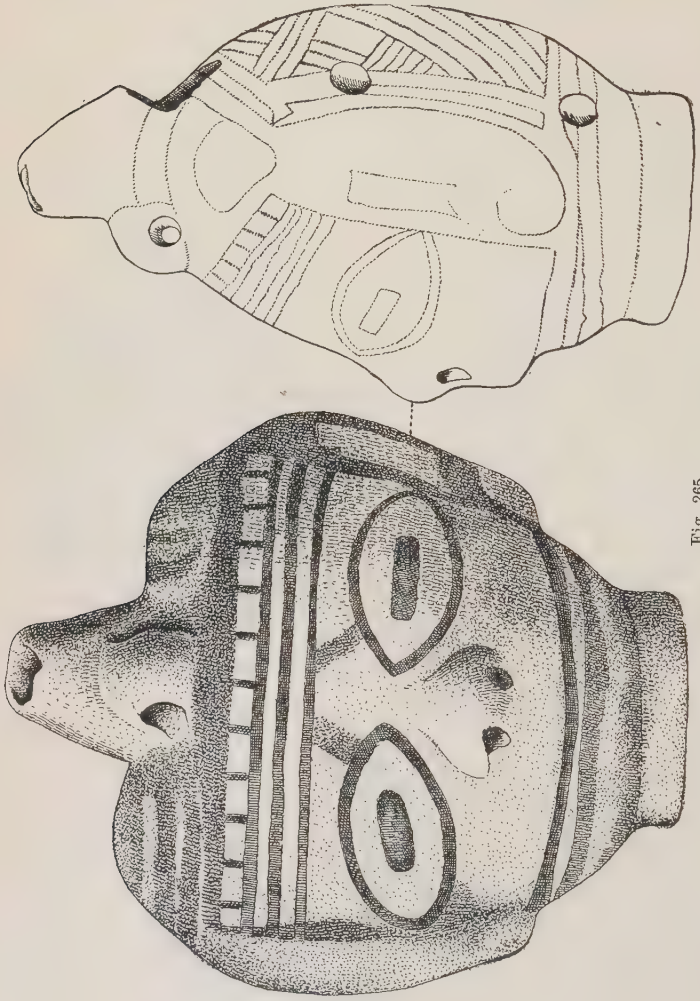
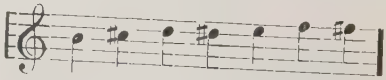


Fig. 265.
POTTERY WHISTLE—GROTESQUE HUMAN HEAD.
Front and profile.
Nicoya, Costa Rica.
Cat. No. 69822, U.S.N.M. Natural size.

panel-like design in the same color. The mouthpiece is attached to and forms part of the headdress. There are four finger holes, two on each side, back of the ears. Seven notes can be obtained as follows:



In this specimen the finger hole marked 4 on the outlined back view

(fig. 266) is larger than the others, the result being two additional notes that would not be obtainable were all the holes of the same size. The following system of fingering will serve to illustrate this:

Finger holes all closed	B♮
Nos. 1, 2, or 3, open	C♯
No. 4, open	D♮
Nos. 1 and 2 / Nos. 2 and 3 / Nos. 1 and 3 open	D♯
Nos. 3 and 4 / Nos. 2 and 4 / Nos. 1 and 4 open	E♮
No. 4, closed	E♮
Nos. 1, 2, or 3, closed	F♮
Finger holes all open	F♯

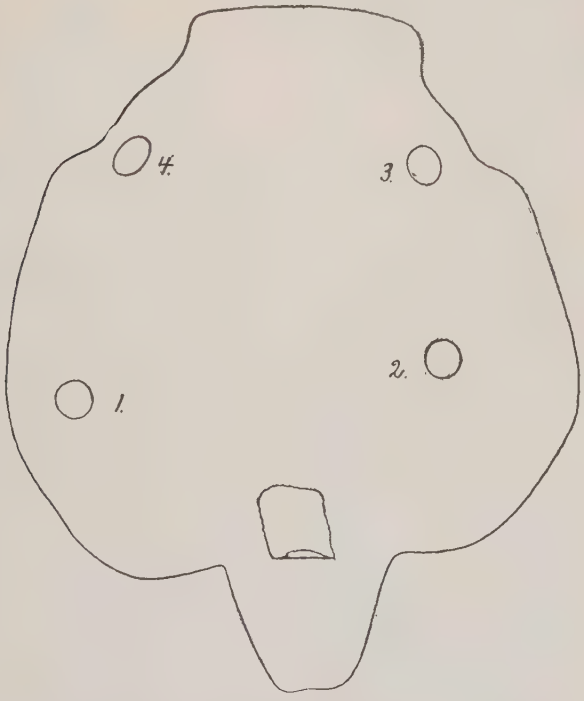


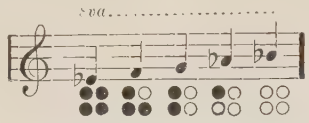
Fig. 266.

OUTLINED BACK VIEW OF FIG. 265, SHOWING POSITION OF FINGER HOLES.

Natural size.

Specimen, Cat. No. 60042 (U.S.N.M.), also from Nicoya and collected by Dr. Bransford. It is a painted whistle in the form of a grotesque figure in a squatting position, with the arms pressed against the body. The ground color is yellow and there are traces of decoration in dark brown. The eyes, nose, and mouth are in high relief.

A prolongation of the headdress serves as a mouthpiece, and there are four sound holes in the front portion of the body. The compass of the instrument is five notes:



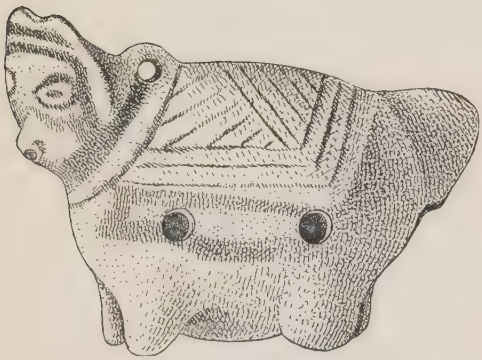


Fig. 267.

POTTERY WHISTLE—ANIMAL-SHAPED.

Nicoya, Costa Rica.

Cat. No. 28955, U.S.N.M. $\frac{2}{3}$ natural size.

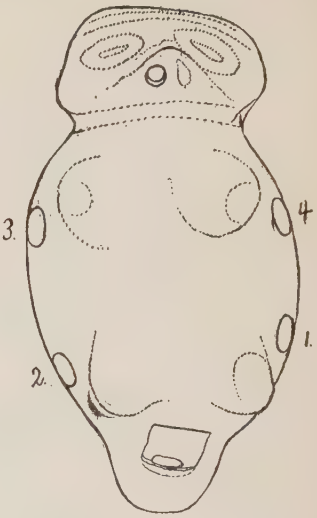


Fig. 268.

OUTLINE OF FIG. 267, SHOWING POSITION OF FINGER HOLES.

The lowest note with all the holes closed; the succeeding intervals are the same by any combination of fingering.

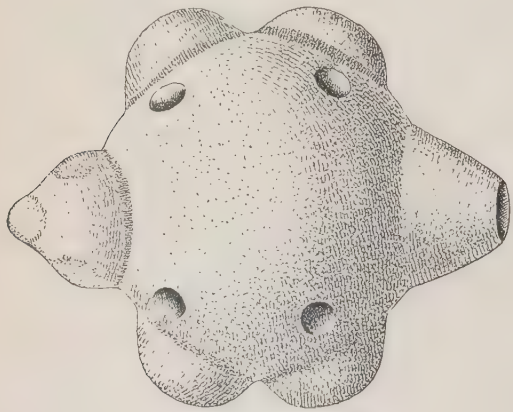
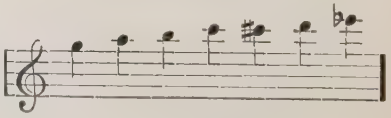


Fig. 269.

POTTERY WHISTLE—TORTOISE-SHAPED.

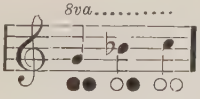
Costa Rica.

Cat. No. 28956, U.S.N.M. $\frac{2}{3}$ natural size.

Fig. 267 represents a whistle from Nicoya in the form of an animal. The painted decorations are in black and red lines on yellow ground. The tail of the animal served as a mouthpiece and there are four finger holes, two on each side of the body where the legs are joined. A raised loop on the back of the neck answers for a suspension hole. Its notes are shown in the following scale:

In this specimen finger hole marked 2 on outline (fig. 268) is larger than the others, and raises the pitch a

semitone when used open in combination. A system of fingering is here given:

Finger holes all closed	G
Nos. 1, 2, 3, or 2, 3, 4, closed	A
Nos. 1, 2, 3, or 4, 1, 2, closed	B
Nos. 1, 2, open	C
Nos. 4, 2, or 1, 3, closed	C
Nos. 2, 3, or 3, 4, or 4, 1, open	C♯
Nos. 1, 2, 3, or 4, closed	D
Finger holes all open	E♭

Specimen, Cat. No. 18119 (U.S.N.M.), is an animal-shaped whistle of painted ware from an ancient grave in Costa Rica. Collected by William H. Gabb. There are two sound holes, one on the left shoulder, the other beneath the body. Its three notes are shown in the accompanying scale:

The note B♭ is the same, stopped with either hole.

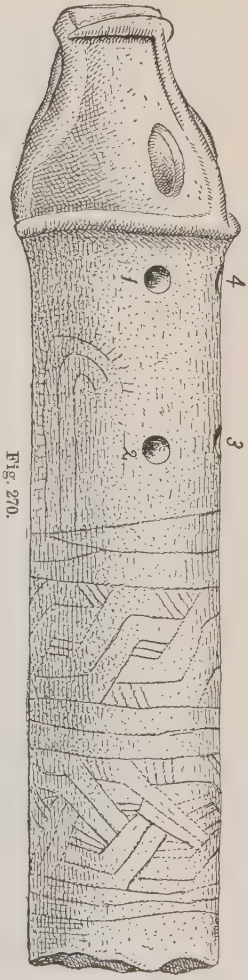


Fig. 270.

POTTERY WHISTLE—TUBE-SHAPED.

Miravalles, Costa Rica.

Cat. No. 6429, U.S.N.M. ⅝ natural size.

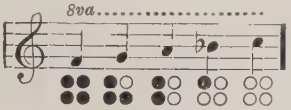
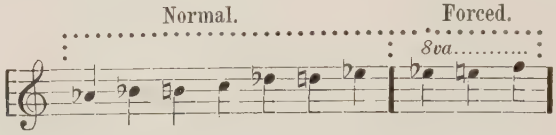
Fig. 269 represents a tortoise-shaped whistle of painted ware from Costa Rica, collected by Drs. Flint and Bransford. There is no mistaking the animal to be represented, as all the features are well executed. The painted decorations in black and red lines are much obliterated. A hole for suspension passes through the lower part of the neck. There are four finger holes on the back. Its five notes are as follows:

The lowest note with all holes closed. The next three intervals are the same, no matter which of the one, two, or three holes are opened. That is, any one of the four holes open, the others closed, will give G; any two open, A; and any three open, B♭. All open, the highest note, C.

Fig. 270 represents a tube-shaped instrument from Miravalles, collected by Capt. J. M. Dow. The upper end is in the form of an animal head and contains the mouthpiece. The lower end (part of which is

missing) is closed, forming an air chamber about 5½ inches long. There are four finger holes, two on each side of a center line on the upper surface. It is painted light brown and slightly polished. The space below the finger holes is ornamented with bands of incised-line chevron designs. Its musical capacity is shown in the accompanying scale:



A slight difference in size of the finger holes adds two notes to the compass of the instrument. The combinations for each tone are here given:

	Normal.	Forced.
Finger holes all closed	A ♭	E ♭
No. 1 or 4, open	B ♭	E ♮
Nos. 1 and 4, open	B ♮	F
Nos. 1 and 2 or 3 and 4 or 1 and 3, open	C	E ♯
Nos. 2 and 3 or 2 and 4, open	D ♭	F
Nos. 1, 2, 3, or 4, 3, 2, open	D ♯	E ♯
Finger holes all open	E ♭	F

The three forced tones shown in the scale are all that can be obtained, no matter what combination of fingering is used.

Fig. 271.
WHISTLING VASE.
Costa Rica.
Cat. No. 167356, U.S.N.M. ⅔ natural size.

Fig. 271 represents a specimen from Costa Rica that is unique. It was received from Señor Rafael Iglesias. It is a round bottomed painted vase with a handle on one side representing an animal head, holding the edge of the rim in its mouth. The rim and lower half of the vase is dark red color, the space between being filled by a broad chevron band in brown and yellow. The features of the animal head are accentuated by lines of brown, and the whole outer surface is highly polished. The air passage is from the inside of the vessel, connecting with a vent hole on the outside of the animal's neck. To produce a sound or note the lips must be placed against the mouth of the vessel in the same manner as would be done

on the large brass instruments of to-day. Its one note is exceedingly shrill and piercing:

A description of some of the musical instruments belonging to now existing tribes in Costa Rica may prove interesting, as showing, by comparison, that their remote ancestors were equally if not more advanced in the art of music.

Specimen, Cat. No. 15413 (U.S.N.M.) is a wooden drum used by the Bri Bri and Tiribi Indians, one of a number presented by Mr. William M. Gabb. The shell is of dark-colored wood in the form of a tapering cylinder—or more like one-half of an hourglass. The head is made of the skin of the iguana lizard (*Iguana tuberculata?*), cemented to the top with the fresh blood and held in place by a cord until dried. It is held under the left arm suspended by a cord over the shoulder, and is beaten by the fingers of the right hand. Length 23 inches, diameter $6\frac{1}{4}$, tapering to $4\frac{1}{8}$ inches.

Fig. 272 represents a whistle made from the leg bone of a small mammal. It is from the Tiribi Indians of Costa Rica, and was presented by Mr. Gabb. The upper end has been cut away and the cavity filled with pitch or gum. Through this an air passage connects with a vent hole $2\frac{1}{2}$ inches from the end. At the lower part is a lateral opening into the natural cavity of the bone. Length 10 inches, diameter 1 inch. Its one note is here given:

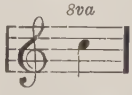



Fig. 273 represents a primitive flageolet, made from a slender bone, probably from the wing of the brown pelican (*Pelecanus fuscus*). It is also from the Tiribi Indians and was collected by Mr. Gabb. The natural cavity at one end of the bone is partly filled with wax or gum, leaving an air passage which connects with a vent hole placed $\frac{7}{8}$ inch distant. This forms a mouthpiece. The other end is open. On the upper surface are five small finger holes, placed about $\frac{7}{16}$ inch apart.

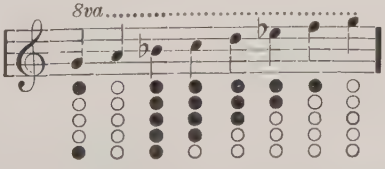
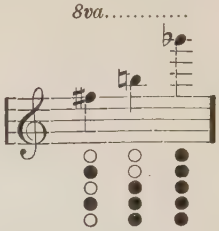
Considerable attention has been given to the musical possibilities of this instrument because of its striking resemblance to the bone whistles from ancient graves on the California Coast and the adjacent islands (p. 571, fig. 211). What may be called its natural scale of six notes is here shown, with the fingering for each tone:

The upper note, G, is obtained with a slightly increased force in blowing. By using greatly increased force and a different system of finger-

Fig. 272.
BONE WHISTLE.
Costa Rica.
Cat. No. 15390, U.S.N.M.
$\frac{3}{4}$ natural size.

Fig. 273.
BONE FLAGEOLET.
Costa Rica.
Cat. No. 18108, U.S.N.M.
$\frac{2}{3}$ natural size.

ing, the notes shown in the following scale are possible:



Other combinations of fingering only produce notes which are already given. It will be seen that, contrary to all the instruments before described, the lowest note is not made with all the sound holes closed. Why this should be so I am unable to explain. Perhaps the peculiar shape of the bone may account for it.

South America.

Chiriqui, Colombia.

The most important group of prehistoric musical instruments in the Museum in point of numbers is from Chiriqui, deposited by Mr. J. A. McNiel. It embraces drums, rattles, and whistles of pottery, and a number of bronze bells. Many of these have been figured by Mr. W. H. Holmes in his interesting paper on "Ancient art in the Province of Chiriqui,"[1] and his descriptions have been here freely used. Whatever will be said in addition relates to examples not figured by him, and is mostly from a musical standpoint, all of the wind instruments having been tested for the purpose of showing their capacity or possibilities in that direction.

[1] Sixth Annual Report of the Bureau of Ethnology, p. 156.

INSTRUMENTS OF PERCUSSION.

Drums.—Fig. 274 represents a drum of gray unpainted clay. According to Mr. Holmes—[1]

The shape is somewhat like that of an hourglass, the upper part, however, being considerably larger than the base or stand. In all cases the principal rim is finished with especial reference to the attachment of the vibrating head. The example presented has a deeply scarified belt an inch and a quarter wide encircling the rim, and below it is a narrow ridge,

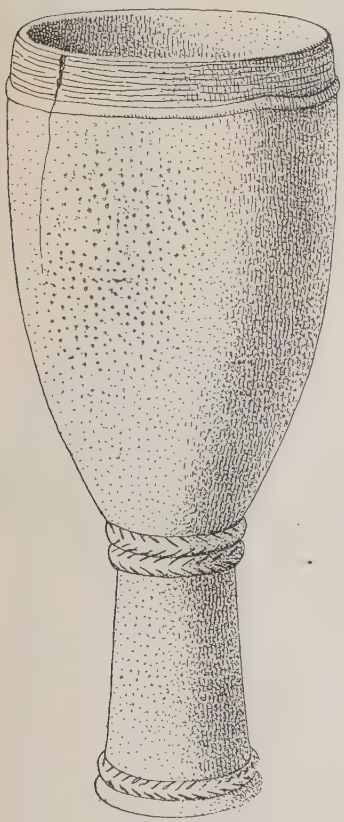


Fig. 274.
DRUM OF GRAY UNPAINTED CLAY.
Chiriqui.
Cat. No. 115353, U.S.N.M. $\frac{1}{4}$ natural size.

Fig. 275.
DRUM WITH PAINTED ORNAMENT.
Chiriqui.
U. S. National Museum.

intended, perhaps, to facilitate the lashing or cementing on of the head. Two raised bands, intended to imitate twisted cords, encircle the most constricted part of the body, a single band similarly marked encircling the base. The surface is gray in color and but rudely polished. The walls are about three-eighths of an inch thick, the height 19½ inches, and the greatest diameter 7½ inches.

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 158, fig. 236.

The following is copied from Mr. McNiel's label attached to the drum:

Grave at Moritana del Bufo, Divala. This and 14 canteros, 1 stool, 5 stone hatchets, 3 "spiners," and human bones, seem to have been the outfit of a musician.

Mr. Holmes continues (p. 159, fig. 237):

The decorated specimen illustrated in fig. 237 [our fig. 275] is imperfect, a few inches of the base having been lost. The shape is rather more elegant than that of the other specimen, and the surface is neatly finished and polished. The ground color, or slip, is a warm yellow gray, and the decoration is in red and black. The rim, or upper margin, is rather rudely finished and is painted red, and on the exterior is made slightly concave and furnished with a raised band to facilitate the attachment of the head.

Rattles.—The instruments of this class from Chiriqui are gourd-shaped, and the majority are painted and decorated in the same manner as the whistles and other pottery objects from that

Fig. 276.
RATTLE OF PAINTED WARE.
Chiriqui.
Sixth Annual Report of the Bureau of Ethnology, fig. 233. Cat. No. 109628, U.S.N.M.
⅔ natural size.

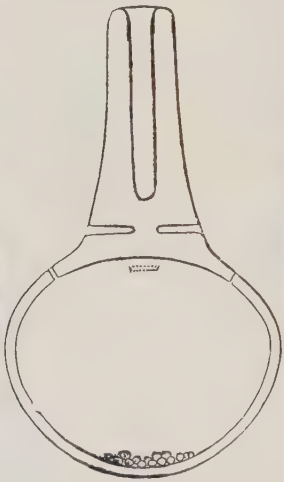


Fig. 277.
SECTION OF RATTLE SHOWN IN FIG. 276.

Fig. 278.
RATTLE OF PLAIN WARE SURMOUNTED BY TWO GROTESQUE FIGURES.
Chiriqui.
Cat. No. 132761, U.S.N.M. ½ natural size.

locality. There are slit-like openings on the upper part of the body, and the sound is produced by a number of small clay pellets inside. The handle is hollow in most cases, and probably served as a whistle. In some specimens the neck is perforated for suspension. The details of their construction are shown in figs. 276 and 277,[1] the latter a section drawing. The sounds produced are weak in comparison with the rattles of the modern Indian, but they may have occupied an important place in the ceremonies of a primitive people.

Specimen, Cat. No. 131437 (U.S.N.M.) is a rattle of plain ware with a solid handle. In fig. 278[2] is shown a rattle of plain ware. The

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 157, figs. 233, 234.
[2] *Idem.*, fig. 235.

handle is represented as a separate piece lashed on with cords. On the upper end of the handle are two grotesque human figures standing back to back.

The following specimens are all gourd-shaped rattles of painted ware, similar in form and construction to fig. 276 (Cat. Nos. 109626, 109627, 109628, 109629, 109630, 109631, 109632, 109647, and 131436, U.S.N.M.).

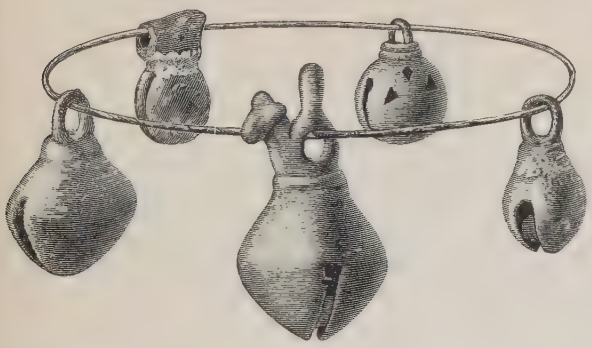


Fig. 279.
BRONZE BELLS, PLATED OR WASHED WITH GOLD.
Chiriqui.
Cat. No. 74675, U.S.N.M. Natural size.

Fig. 280.
BRONZE BELL WITH HUMAN FEATURES.
Chiriqui.
Stearns Collection.

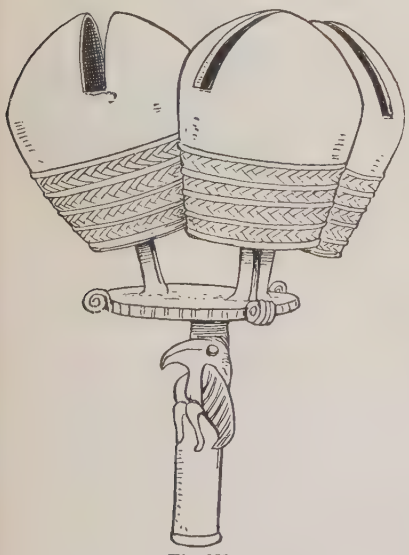


Fig. 281.
TRIPLE BELL OR RATTLE OF GOLD.
Chiriqui.
Stearns Collection.

METAL INSTRUMENTS.

Bronze bells.—The descriptions and illustrations here given of metallic objects are mostly taken from Mr. Holmes's paper.[1]

Bells seem to have been in pretty general use by the more cultured American races previous to the conquest. The form best known is the hawk bell, or common sleigh bell of the North. The globular body is suspended by a loop at the top and is slit on the under side, so that the tinkling of the small free pellets of metal may be audible. Such bells are found in considerable numbers in the graves of Chiriqui, although I have no positive assurance that any of the examples in my possession were actually taken from graves which contained typical Chiriquian relics of other classes. The specimens now in the National Museum (fig. 41) [our fig. 279] are in most cases, if not in all, of bronze, as determined by Mr. R. B. Riggs, of the chemical laboratory of the United States Geological Survey. All have been cast in molds. In most

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, pp. 49, 50, figs. 41, 42, 43.

cases there are traces of a plating of gold. The largest is 1¼ inches in height and three-fourths of an inch in diameter. It is surmounted by the rude figure of an animal, through or beneath the body of which is an opening or attachment of a cord. Others have simple loops at the top. The small perforated one belongs to Mr. J. B. Stearns, of Short Hills, New Jersey. The additional piece given in fig. 42 [our fig. 280] is unique in conception. It represents a human head, which takes an inverted position when the bell is suspended. The lower part of the bell forms a conical crown to the head and the ring of suspension is attached to the chin. Double coils of wire take the place of the ears, and the other features are formed by setting on bits of the material used in modeling. This specimen belongs to the collection of Mr. Stearns. Many examples of more elaborate workmanship have been recovered from the tombs and are now to be found in the collections of America and Europe. A specimen found many years ago on the Rio Grande near Panama, and figured in Harper's Weekly, was of gold and showed specific variations from the Chiriquian pieces. It will be seen by reference to the outline given in fig. 43 [our fig. 281] that three very neatly shaped and gracefully ornamented bells are mounted upon a circular plate to which a short handle is attached. It was evidently not intended for suspension, but rather to be held in the hand as a rattle.

Fig. 282.
GOLD RATTLE.
Antioquia.
Cat. No. 148170, U.S.N.M.
Natural size.

Fig. 282 represents a small gold rattle from a prehistoric grave in the province of Antioquia, Colombia, South America, received from Mr. Thomas Herran. The upper part is globular, and contains the metal pellet which produces the tinkling sound. The stem or handle is tapering and encircled by raised fillets. It was evidently cast in a mold. The tone is weak compared with that obtained from the bells made of bronze previously mentioned, the natural properties of gold not being as resonant.

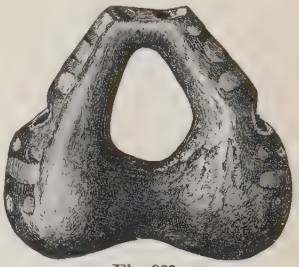


Fig. 283.
DOUBLE WHISTLE.
Chiriqui.
U. S. National Museum. Natural size.

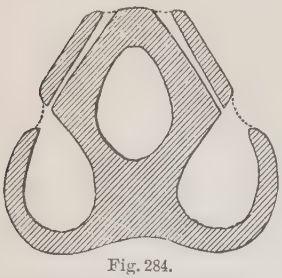


Fig. 284.
SECTION OF DOUBLE WHISTLE, FIG. 283.

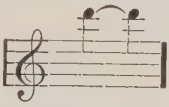
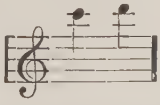
WIND INSTRUMENTS—POTTERY.

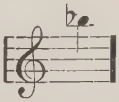
Double whistles.—These are the simplest form and need not be described separately. They are all pear or gourd shaped, joined above and below, and have an opening between the necks. The mouthpieces are where the stems are joined, and are so close together that both must be blown at the same time. Two tones are produced, and in a majority of the instruments these are identical in pitch. Where there is a difference it will be indicated in the accompanying scales. Fig. 283 represents one of this series, and the section in fig. 284 shows the relative positions of the mouthpieces, air passages,

ventholes, and chambers. These are reproduced from Mr. Holmes's paper.[1]

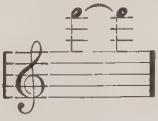
The note produced is pitched very high and is extremely penetrating:

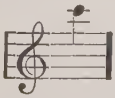
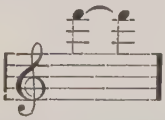
The following list gives the catalogue number and the pitch of the notes obtained from the whistles of this class in the Museum collection, which are not figured:[2]

Specimen, Cat. No. 109737 (U.S.N.M.), unpainted ware:

Specimen, Cat. No. 131948 (U.S.N.M.), unpainted ware:

Specimen, Cat. No. 109719 (U.S.N.M.), unpainted ware, mutilated. Only one side will produce a tone:

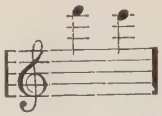
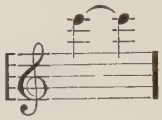
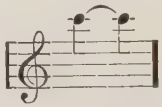
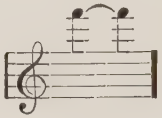


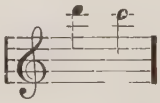
Specimen, Cat. No. 75550 (U.S.N.M.), painted dull red color:

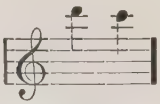


Specimen, Cat. No. 109678 (U.S.N.M.), painted dull red color. Only one side will emit a note, the venthole on the opposite side being broken:

Specimen, Cat. No. 132756 (U.S.N.M.), painted dull red:

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 161, figs. 239, 240.

[2] The notes given by these double whistles should read an octave higher than indicated on the staff.

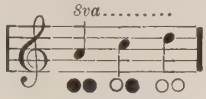
Specimen, Cat. No. 132727[1] (U.S.N.M.), painted dull red color. Difference of a semitone between the two sides:

Specimen, Cat. No. 132758[1] (U.S.N.M.), painted dull red color:

Specimen, Cat. No. 133465[1] (U.S.N.M.), painted dull red color:

Specimen, Cat. No. 131945[1] (U.S.N.M.), painted dull red color:

Specimen, Cat. No. 131946[1] (U.S.N.M.), painted, decoration in black on red ground. Lost color ware. Difference of a tone between the two sides:



Specimen, Cat. No. 131947[1] (U.S.N.M.), painted, decoration in black on red ground. Lost color ware:

Bird-shaped whistles of unpainted ware.—In fig. 285 is presented one of this class. The body is short and wide, with the wings spread. Its long neck terminates in a triangular-shaped head, with protruding eyes upon the top. There are two finger holes in the breast, and the tail

[1] See note 2, p. 629.

serves for a mouthpiece, as is usual in the bird-shaped instruments. Three notes are possible, as follows:



The lower note is obtained with both holes closed, the upper one with both open, and the middle tone with either, no matter which, closed. Unless otherwise stated, this is true of all the bird-shaped whistles with two finger holes.

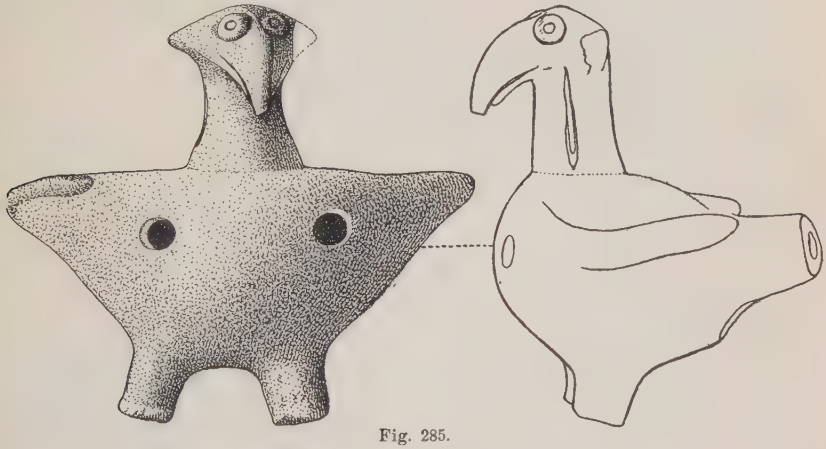
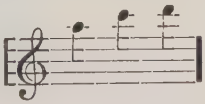


Fig. 285.

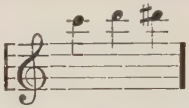
BIRD-SHAPED WHISTLE, UNPAINTED WARE.

Chiriqui.

Cat. No. 109708, U.S.N.M. $\frac{2}{3}$ natural size.

Specimen, Cat. No. 131941 (U.S.N.M.) is a smaller whistle of the same general character. There are two finger holes in the breast, making the compass of the instrument three notes:

Specimen, Cat. No. 109662 (U.S.N.M.) is in principle the same as the preceding. The difference in musical tones will be seen in the accompanying scale:

Bird-shaped whistles, colored red, without painted decorations.—The whistles in this group need not be described individually. They are all bird shaped, varying in size, slip-washed red and without decorations. There are two finger holes in the breast of each. Three notes

can be obtained from all; the lower when both sound holes are stopped, the next higher with one stop, and the upper note with both holes open. The second or middle note is the same whether stopped on one side or the other. Fig. 286 represents one of the series. Its three notes are as follows:

The following list gives the catalogue number and the accompanying scales the notes emitted by whistles with two holes not figured.

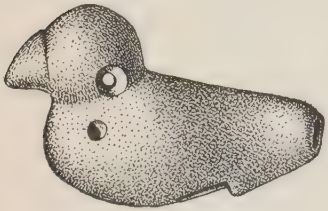
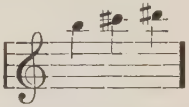
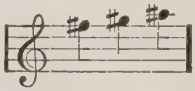
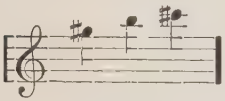
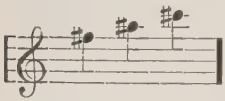
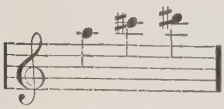


Fig. 286.
BIRD-SHAPED WHISTLE, COLORED RED.
Chiriqui.
Cat. No. 131938, U.S.N.M. $\frac{2}{3}$ natural size.

Specimen, Cat. No. 109672 (U.S.S.N.M.):



Specimen, Cat. No. 132755 (U.S.S.N.M.):

Specimen, Cat. No. 109665 (U.S.N.M.):

Specimen, Cat. No. 109666 (U.S.N.M.):

Specimen, Cat. No. 109649 (U.S.N.M.):



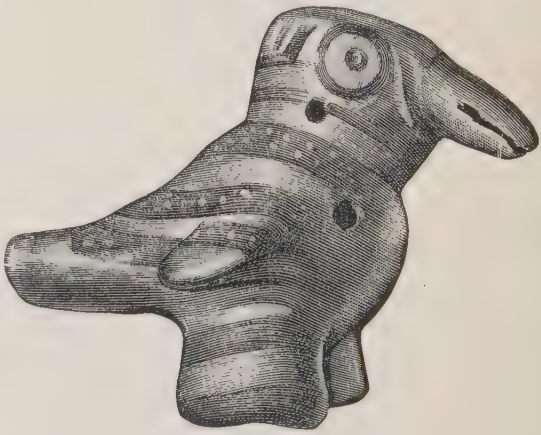


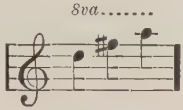
Fig. 287.
BIRD-SHAPED WHISTLE, PAINTED DECORATION.
Chiriqui.
Cat. No. 109656, U.S.N.M. Natural size.

Specimen, Cat. No. 109711 (U.S.N.M.), mutilated, tones indistinct.

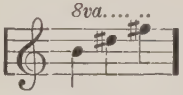
Specimen, Cat. No. 109658 (U.S.N.M.), mutilated.

Bird-shaped whistles with painted decorations.—The air passages, sound holes, etc., are the same as in the whistles just described. A short description of the decorations, which refer more or less to the markings of the plumage, and a scale indicating the musical capacity will accompany each number. In all specimens the neck (of the bird) is pierced for a suspension hole.

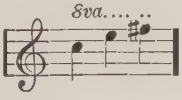
An example of this class is shown in fig. 287, which is reproduced from Mr. Holmes's paper.[1] The ground color is yellow. The neck, tail, and underpart of the body are painted red, and band decorations in black pass around the front and upper surface. (Lost color ware.) The following notes are emitted:



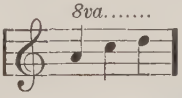
Specimen, Cat. No. 109671 (U.S.N.M.). Small whistle, dark yellow ground with a broad stripe of red on the breast and lower part of the body. Its three notes are as follows:



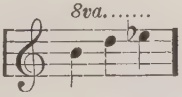
Specimen, Cat. No. 131939 (U.S.N.M.). Small whistle. Pale red ground color with traces of decoration in black. Three notes:



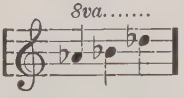
Specimen, Cat. No. 109661 (U.S.N.M.). Small whistle. Red ground color with black decoration. Three notes as follows:



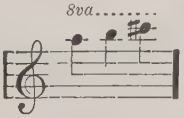
Specimen, Cat. No. 133464 (U.S.N.M.). Small whistle. Dark yellow ground color. Breast and lower part of body painted red. Three notes:



Specimen, Cat. No. 131940 (U.S.N.M.). Small whistle. Dark yellow ground color, with traces of decoration in black. Three notes:



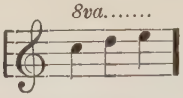
Specimen, Cat. No. 75549 (U.S.N.M.). Small whistle. Grayish yellow ground color, with red and black decoration. Three notes, as follows:



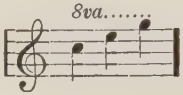
Specimen, Cat. No. 109674 (U.S.N.M.). Small whistle. Pale yellow

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 168, fig. 253.

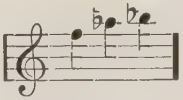
ground color, with traces of decoration in black or brown. Three notes:



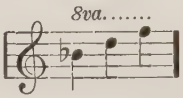
Specimen, Cat. No. 109713 (U.S.N.M.). Ground color, pale brown. The upper part of the body is deep red, and there are line decorations in red and black on the tail. The whole surface is polished. Its three notes are here indicated:



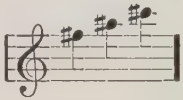
Specimen, Cat. No. 106669 (U.S.N.M.). The lower part of the body is painted red; the upper part pale yellow. Decoration in black of conventional designs on all surfaces. Three notes, as follows:



Specimen, Cat. No. 109652 (U.S.N.M.). The head, breast, and lower part of the body are painted red. The upper part of the body is pale yellow, upon which are decorations in black. Its three notes are here indicated:



Specimen, Cat. No. 109663 (U.S.N.M.). The body is painted red, the head and neck grayish yellow, and there are traces of ornamentation in black. Three notes, as follows:



Specimen, Cat. No. 131936 (U.S.N.M.). The ground color is dark red, and the decorations in black are much obliterated. Its three notes are indicated in the accompanying scale:

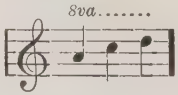
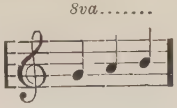


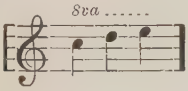
Fig. 288 represents one of the large bird-shaped specimens. The cut is reproduced from Mr. Holmes's paper,[1] and his description follows:

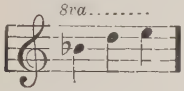
The piece given in fig. 254 [our fig. 288] has the shape and markings of a hawk or eagle. It belongs to the alligator ware and is elaborately finished in semi-geometric devices in red and black.

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 169, fig. 254.

Its three notes are here indicated:



Specimen, Cat. No. 109710 (U.S.N.M.). The decorations, which are well preserved, are in black and red on pale yellow ground. Three notes are emitted:

Specimen, Cat. No. 131937 (U.S.N.M.). The body is painted red, the head and neck yellow, and there are traces of decoration in black. The two upper notes are indistinct on account of a fracture in the mouthpiece.



Specimen, Cat. No. 109709 (U.S.N.M.) represents an owl. The ground color is gray and the decorations are conventional devices in red and brown. Three notes:

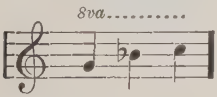


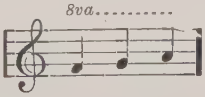
Fig. 288.

BIRD-SHAPED WHISTLE, CONVENTIONAL DECORATION IN BLACK AND RED.

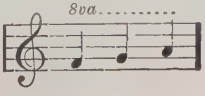
Chiriqui.

Cat. No. 109712, U.S.N.M. Natural size.

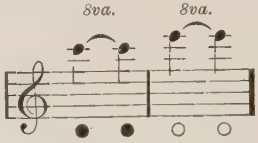
Specimen, Cat. No. 131935 (U.S.N.M.) represents a parrot. The ground color is gray and the decoration quite simple, consisting of lines and dots in red and black. Its three notes are indicated in the accompanying scale:



Specimen, Cat. No. 1167 (U.S.N.M.), also from Chiriqui, was presented by Col. E. Jewett. It is parrot shaped, and the decorations are conventional devices in red and black on yellow ground. Its three notes are as follows:

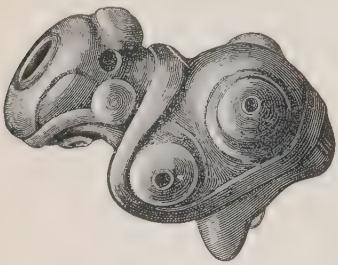


In fig. 289 is shown a small double whistle representing two birds with their bodies joined together. The tails form a mouthpiece with the air passages close together, as are the small pear-shaped whistles heretofore described. The decoration is simple, consisting of a few black lines on the body and the beak or bill painted red. There are two finger holes, one on the outside of each body. When these are closed a tone is produced a major third below that given when

Fig. 289.
DOUBLE WHISTLE, TWO BIRDS.
Chiriqui.
Cat. No. 133462, U.S.N.M.
⅔ natural size.

open. The notes are in unison, extremely shrill and piercing.

Animal-shaped whistles.—In fig. 290 *a*, *b*, are shown two views of a small animal-shaped whistle of dark clay. These are reproduced from Mr. Holmes's paper,[1] and in describing two specimens of this class he says:

Two little instruments of remarkable form and unusual powers stand quite alone among their fellows. One only is entire. It is made of dark clay, and represents a creature not referable to any known form, so completely is it conventionalized. A fair idea of its appearance can be gained from figs. 243 and 244 [our figs. 290 *a*, *b*].

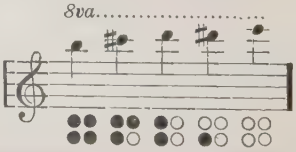


a

b

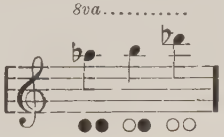
Fig. 290.
ANIMAL-SHAPED WHISTLE OF BLACKISH WARE.
Chiriqui.
Cat. No. 109732, U.S.N.M. Natural size.

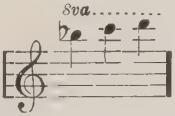
The first gives the side view and the second the top view. The mouthpiece is in what appears to be the forehead of the creature. The venthole is beneath the neck, and there are four minute finger holes, one in the middle of four flattish nodes, which have the appearance of large protruding eyes. A suspension hole passes through a node upon the top of the head. The capacity of this instrument is five notes, clear in tone and high in pitch. It is notable that the pitch of each stop when open alone is identical, the holes being exactly the same size.



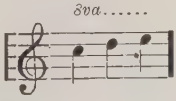
[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 162, figs. 243, 244.

In playing it does not matter in what order the fingers are moved. The lower note is made with all the holes closed, and the ascending scale is produced by opening successively one, two, three, and four holes. The fragmentary piece [Cat. No. 109741, U.S.N.M.] is much smaller and the holes are extremely small.

Specimen, Cat. No. 133463 (U.S.N.M.) is a small, monkey-shaped whistle of painted ware. The ground color is light red, and the decorations consist of black and dark red lines and dots. The animal is represented in a squatting position, with its long tail curved upward and attached to the back of the neck. The mouthpiece is in the tail, and there are two finger holes, one on each shoulder. Six notes can be obtained—three with normal force in blowing:

and three by using more force, thus:



Specimen, Cat. No. 109723 (U.S.N.M) is a semihuman figure of plain red polished ware. The egg-shaped body is supported by two short legs, one of which serves as a mouthpiece. The left arm is raised to the head; the right is placed akimbo. A long tail curves up the back. The two sound holes are placed one in front and the other in the rear of the left shoulder. Its three notes are here given:



Specimen, Cat. No. 109655 (U.S.N.M.) represents a puma. It is of painted ware, and the ground color is yellow. Conventional decorations in black represent the skin markings of the animal. There are two finger holes, one on each fore shoulder, and the tail serves as a mouthpiece. Its three notes are as follows:

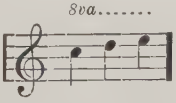


Fig. 291 represents a cat-shaped whistle of painted ware. Mr. Holmes, in describing this specimen,[1] says:

The mouthpiece is in the tail, and one of the sound holes is in the left shoulder and the other beneath the body. The head is turned to one side and the face is decidedly cat-like in expression. The decoration is in black and red, and may be taken as a typical example of the conventional treatment of the markings of the bodies of such

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 167, fig. 251.

Fig. 291.

CAT SHAPED WHISTLE OF PAINTED WARE.

Chiriqui.

Cat. No. 109657, U.S.N.M. Natural size.

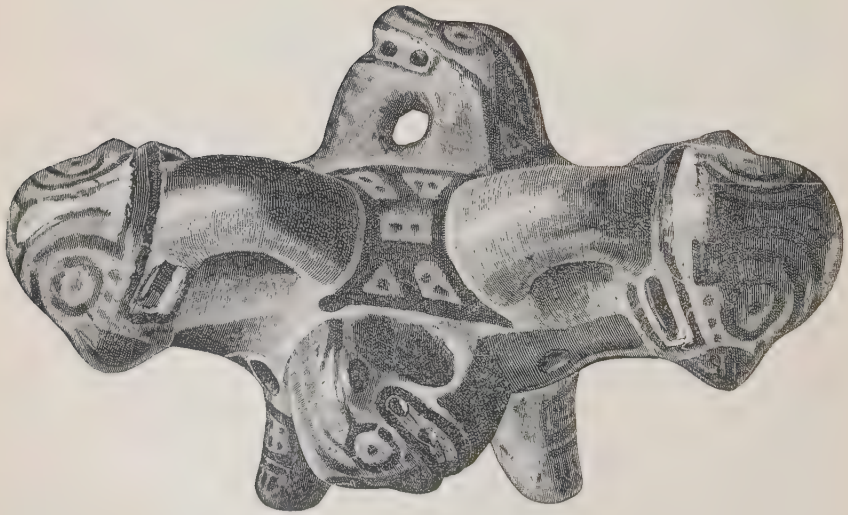


Fig. 292.

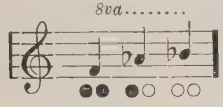
WHISTLE WITH FOUR OCELOT-LIKE HEADS.

Chiriqui.

Cat. No. 132751, U.S.N.M. Natural size.

animals. The tips of the ears, feet, and tail are red. Rows of red strokes, alternating with black, extend in a broad stripe from the point of the nose to the base of the neck. Red panels, inclosing rows of red dots and enframed by black lines, cross the back. On the sides we have oblong spaces filled in with conventional devices so common in other animal representations. The legs are striped and dotted after the usual manner.

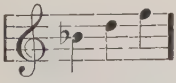
Its three notes are as follows:



In fig. 292 is shown a painted whistle with four ocelot-like heads. This is reproduced from Mr. Holmes's paper (p. 168, fig. 252), and his description in part is here given:

The instrument consists of an oblong body, to which four ocelot-like heads are fixed, one at each end and the others at the sides. It rests upon four feet, in one of which the mouthpiece is placed. The finger holes are in the side of the body, near the legs, as seen in the cut. The decoration, which consists of more or less conventional representations of the skin markings of the animal, is in black and red.

Its notes are three, as follows:



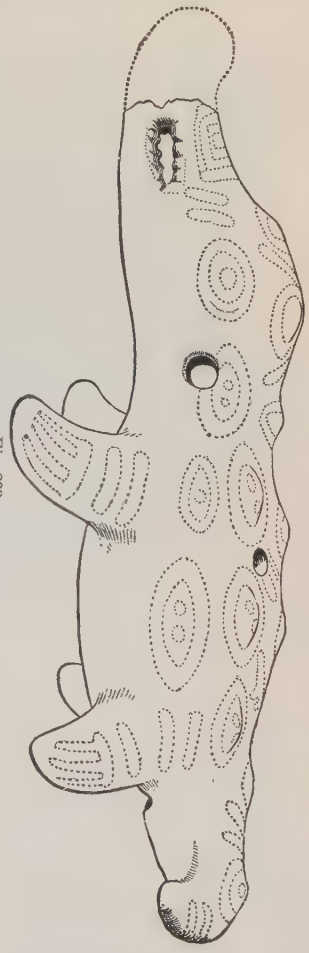


Fig. 293.

ALLIGATOR-SHAPED WHISTLE OF PAINTED WARE.

Chiriqui.

Cat. No. 132970, U.S.N.M. ⅓ natural size.

Fig. 293 represents an alligator-shaped whistle of painted ware. This is the largest specimen in the collection, and Mr. Holmes, in speaking of it (p. 166, fig. 250), says:

The air chamber is large, and the sounds emitted are full and melodious and are lower in pitch than those of any other instrument in the collection. The cavity in the mouth and head is separated from the body chamber, and, with the addition of earthen pellets, probably served as a rattle. The mouthpiece is in the tail and the finger holes are in the sides of the body.

Its three notes are shown in the accompanying scale:

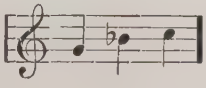
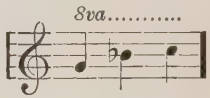


Fig. 294 presents a back view of a crab-shaped instrument. Mr. Holmes[1] says of this:

On the opposite side are four small conical legs, upon which the object rests as does a vase upon its tripod. The mouthpiece is in the right arm, beneath which is the venthole. The two finger holes are in the back, behind the eyes of the creature, and a suspension hole is seen in the left arm. The painted designs are in red and black lines upon a yellowish-gray ground.

Fig. 294.
CRAB-SHAPED WHISTLE OF PAINTED WARE.
Chiriqui.
Cat. No. 132752, U.S.N.M. Natural size.

The following scale indicates its capacity:



Specimen, Cat. No. 109742 (U.S. N.M.) is an animal-shaped whistle of unpainted ware. The mouthpiece is missing; consequently no sound can be produced. There are two finger holes on the back, one on each side over the fore shoulders.

Whistles of complex form.—In this group are a number of instruments in which bird, animal, and other forms are combined. The division is purely arbitrary and only made for convenience of description. Fig. 295 represents one of the series. It is painted a dull red color, without decoration, and the whole surface is polished. The body and feet are of the conventional bird shape, the head being somewhat cat-like. In the place of wings are two feet or arms, one raised to the mouth and the other placed back of the left ear. The tail, which serves as a mouthpiece, is curled over the back and attached to the body below the neck. There are two sound holes in the breast. One of

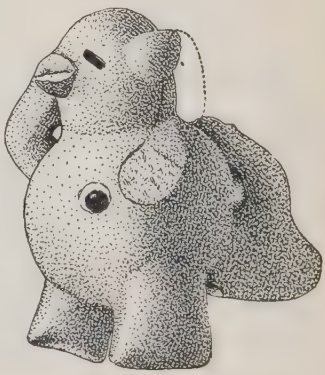
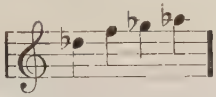
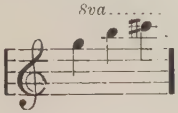
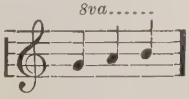


Fig. 295.
WHISTLE, COMPLEX FORM.
Chiriqui.
Cat. No. 109660, U.S.N.M. $\frac{7}{8}$ natural size.

[1] Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 165, fig. 249.

these being larger than the other, either by accident or design, adds one note to its scale, which is here given:

Specimen, Cat. No. 109668 (U.S.N.M.) is a small whistle, partly animal and partly bird in shape. It is of plain red ware with polished surfaces. The tail serves as a mouthpiece, and there are two sound holes in the breast. Its three notes are as follows:

Specimen, Cat. No. 109651 (U.S.N.M.) has a bird-like body with an animal head. The face, breast, and under part of the body is painted a dull red color. The upper is pale yellow, upon which are traces of a band decoration in black. There are two sound holes in the breast, and the notes emitted are indicated in the following scale:



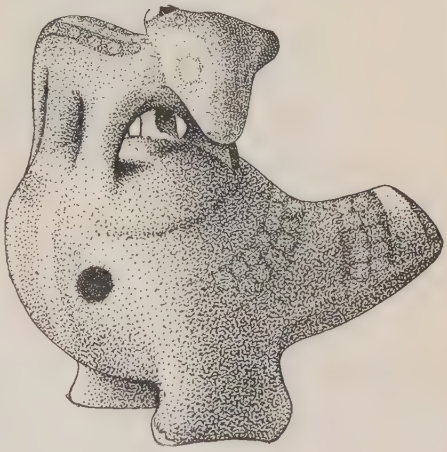
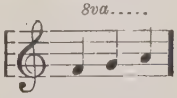
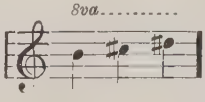


Fig. 296.
WHISTLE, COMPLEX FORM.
Chiriqui.
Cat. No. 109650, U.S.N.M. $\frac{2}{3}$ natural size.

Specimen, Cat. No. 131942 (U.S.N.M.) is an exceedingly grotesque form. The body is bird-shaped with a monkey-like head and fore feet. One of these grasps the tail and the other is held to the mouth. The decoration is in black and red on yellow ground. There are two finger holes, one beneath the left fore leg or arm, the other on the back. The tail serves as a mouthpiece, and the notes obtained are given in the accompanying scale:



Specimen, Cat. No. 133461 (U.S.N.M.) is also a combination of animal and bird forms. The decoration is in red and black lines and dots on yellow ground. There are two sound holes in the breast. Its three notes are here given:



In fig. 296 is presented a curious form of whistle. The lower part of the instrument is bird-shaped, and standing transversely across the

body is the figure of an animal (puma?). The body of the bird is dull red in color, with traces of decoration in black. Upon the animal, which is painted grayish yellow, are the conventional representations of skin markings in black. There are two finger holes in the breast of the bird, and its tail forms a mouthpiece. Its notes are given in the accompanying scale:

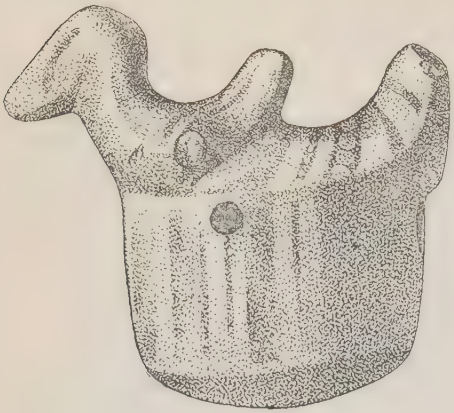


Fig. 297.
WHISTLE, COMPLEX FORM.
Chiriqui.
Cat. No. 133448, U.S.N.M. ⅔ natural size.

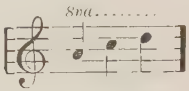
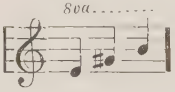
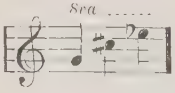


Fig. 297 represents an instrument having somewhat the appearance of a small covered dish with a prolongation for a handle, which serves as a mouthpiece. Upon the top or cover is the figure of a bird. The ground color of the dish or air chamber is red and that of the bird figure pale yellow. Upon both are line decorations in black. There are two sound holes near the upper edge opposite the mouthpiece. Its three notes are as follows:



Specimen, Cat. No. 133449 (U.S.N.M.) The body of this instrument is similar to the one just described (fig. 297). It is painted dull red and polished. A grotesque figure with an animal-like head is attached to the upper part. There are two finger holes on the side opposite the mouthpiece. Threenotesareemitted:



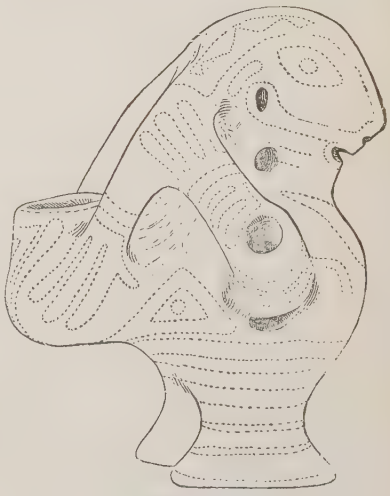
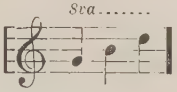


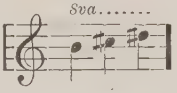
Fig. 298.
WHISTLE, GROTESQUE FORM.
Chiriqui.
Cat. No. 109722, U.S.N.M. ⅔ natural size.

Specimen, Cat. No. 133450 (U.S.N.M.). The outline of this whistle is the same as the preceding (fig. 297), but having the head of a reptile (?) on the upper part opposite the handle or mouthpiece. The

ground color is pale red, and there are traces of line decoration in black. There are two sound holes, and its three notes are indicated in the following scale:



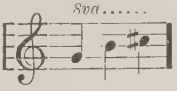
Specimen, Cat. No. 109714 (U.S.N.M.) is a small whistle of the same class. Upon the upper part is the figure of a bird with a suspension hole passing through the body. The color is dark red without decoration, and all surfaces are polished. There are two sound holes, and its three notes are here given:



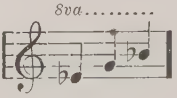
Whistles in grotesque forms.—In this series are placed a limited number of instruments from Chiriqui, in which the human figure is represented. Mr. Holmes,[1] in speaking of these objects, says:

> The human figure was occasionally utilized. The treatment, however, is extremely rude and conventional, the features having the peculiar squirrel-like character shown in the figurines already given. The unique piece given in fig. 256 [our fig. 298] represents a short, clumsy female figure with a squirrel face, carrying a vessel upon her back by means of a head strap, which is held in place by the hands. The mouthpiece of the whistle is in the right elbow and one sound hole is in the middle of the breast and the other in the left side. The costume and some of the details of anatomy are indicated by red and black lines in the original.

Its three notes are as follows:



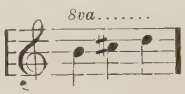
Specimen, Cat. No. 109659 (U.S.N.M.) is a painted whistle representing a female. The ground color is light red, the mouth, arms, and knees being outlined with stripes of darker color. The body is short and broad, with stumpy legs set wide apart, and the arms are attached to the body in relief. The hollow head contains a small clay pellet, which produces a rattling sound. A prolongation of the left shoulder serves as a mouthpiece. There are two finger holes beneath the right shoulder, one on the breast and the other nearly opposite on the back. Its three notes are indicated in the accompanying scale:



An instrument similar in form to the statuettes figured and described

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 170, fig. 256.

by Mr. Holmes[1] is presented in fig. 299. It represents a female figure in a sitting position. The ground color in yellow and the painted designs in black and red, indicating some of the details of costume, are much obliterated. The mouthpiece is in the left shoulder, and there are two sound holes, one above the right breast, the other near the center of the body. Its three notes are here given:



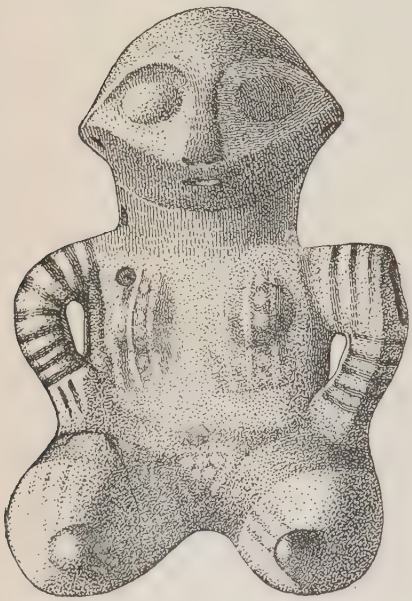


Fig. 299.
WHISTLE REPRESENTING FEMALE FIGURE.
Chiriqui.
Cat. No. 109706, U.S.N.M. $\frac{1}{2}$ natural size.

Specimen, Cat. No. 131435 (U.S.N.M.) is a grotesque figure in a standing position. The legs are extremely short and the large, triangular-shaped head is out of proportion to the size of the body. The left arm rests against the side and the right is raised to the mouth. The ground color is yellow and the painted decoration quite simple, two bands of red encircling both the upper and lower portions of the body. There are two sound holes in the breast. A mouthpiece which protruded from the back is missing, consequently its former musical capacity is unknown.

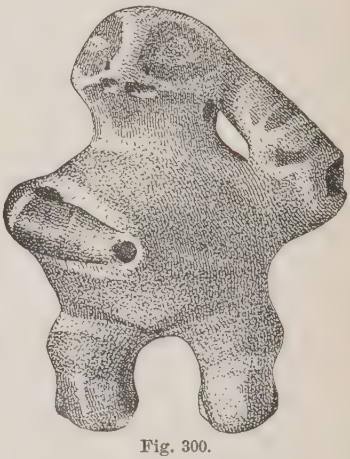
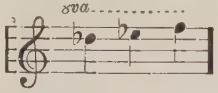


Fig. 300.
WHISTLE, GROTESQUE FORM.
Chiriqui.
Cat. No. 131943, U.S.N.M. $\frac{9}{10}$ natural size.

Fig. 300 represents a small grotesque figure of painted ware. A good idea of its shape can be obtained from the sketch. The painted decoration is in purple and red, upon a ground color of grayish yellow. The left arm is raised to the head and has an aperture at the elbow which serves as a mouthpiece. The right arm is folded across the center of the body in front. There are two finger holes, one below the right shoulder, the other

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 151.

passing through the right hand where it is laid against the body. Its three notes are as follows:



Drum-shaped whistles.—In addition to the various forms which have been described there are a number of shapes copied from other musical instruments. An interesting example is shown in fig. 301. The cut is reproduced from Mr. Holmes's paper,[1] and in speaking of this class of objects he says:

Fig. 301.

DRUM-SHAPED WHISTLE OF PLAIN WARE, BIRD FIGURE ATTACHED.

Chiriqui.

Cat. No. 109721, U.S.N.M. Natural size.

> A very interesting specimen, illustrated in fig. 247 [our fig. 301], modeled in imitation of a drum, has not only the general shape of that instrument, but the skin head, with its bands and cords of attachment, is truthfully represented. A curious conceit is here observed in association of the bird—a favorite form for the whistle—with the drum. A small figure of a bird extends transversely across the body of the drum chamber, the back being turned from the observer in the cut. The tail serves for a mouthpiece, while the finger holes are placed in the breast of the bird, the position usually assigned them in simple bird whistles.

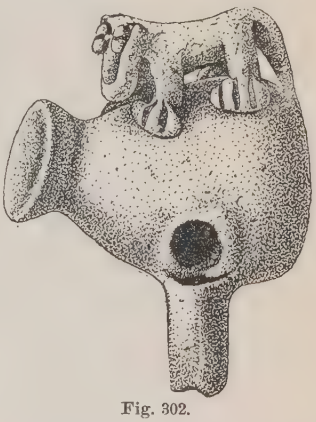
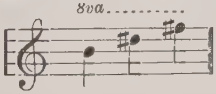


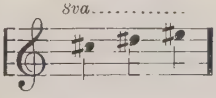
Fig. 302.

DRUM-SHAPED WHISTLE OF PLAIN WARE, GROTESQUE ANIMAL FIGURE ATTACHED.

Chiriqui.

Cat. No. 109720, U.S.N.M. ⅔ natural size.

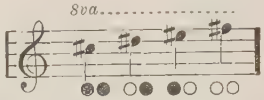
Its three notes are indicated in the accompanying scale:

Specimen, Cat. No. 109718 (U.S.N.M.) is a plain drum-shaped whistle of unpainted ware. A prolongation on one side forms the mouthpiece, and there are two finger holes. The compass of the instrument is three notes, as follows:



Another drum-shaped whistle belonging to the unpainted group is shown in fig. 302. On the side opposite the mouthpiece is attached a

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 165, fig. 247.

grotesque animal-shaped figure. There are two sound holes, and one being slightly larger than the other adds a note to the compass of the instrument, as indicated in the accompanying scale:



Specimen, Cat. No. 109673 (U.S.N.M.) is a small whistle painted grayish yellow. A prolongation at the upper part, or drumhead, forms the mouthpiece. There are two finger holes, one on each side of the air chamber. Its three notes are as follows:

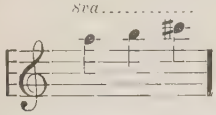



Fig. 303 represents a painted

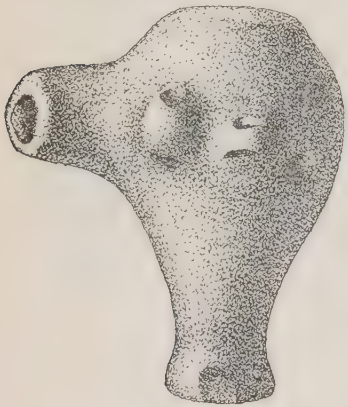


Fig. 303.

DRUM-SHAPED WHISTLE OF PAINTED WARE.

Chiriqui.

Cat. No. 131944, U.S.N.M. $\frac{1}{2}$ natural size.

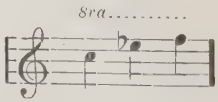
Fig. 304.

TOP-SHAPED INSTRUMENT WITH THREE FINGER HOLES.

Chiriqui.

Cat. No. 109682, U.S.N.M. Natural size.

instrument with the same general outline as the preceding. The ground color is dark brown and there are traces of line or band decoration in red. A prolongation on one side of the air chamber forms the mouthpiece, and there are two finger holes on the opposite side. A raised fillet or loop on the surface between the mouthpiece and sound holes serves for a suspension hole. The tones emitted are round and full, and are indicated in the following scale:



Top-shaped whistles.—There are in the collection two instruments of this form. The size and details of construction are shown in figs. 304

and 305. The cuts are reproduced from Mr. Holmes's paper,[1] and his description is here given in full:

Of a distinct type of form, although involving no new principle of construction, are two top-like or turnip-shaped instruments, one of which is shown in fig. 245 [our fig. 304]. The form is symmetrical, the ornamentation tasteful, and the surface highly polished. The ware is of the alligator group and is decorated in red and black figures. A section is given of 246*a* [our fig. 305] and the top and bottom views in *b* and *c*. By reference to these a clear conception of the objects can be formed.

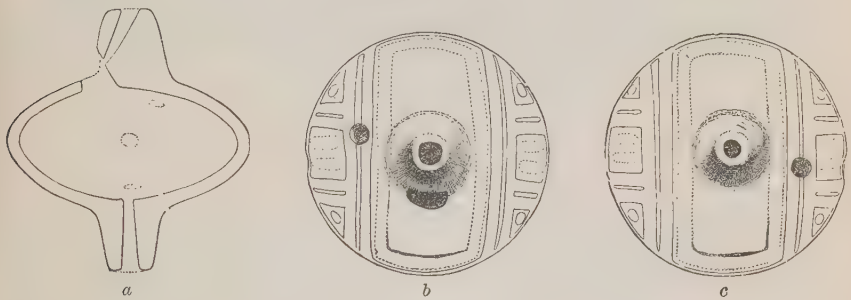
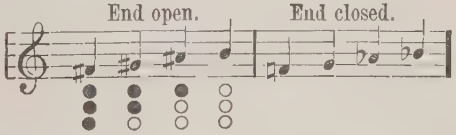
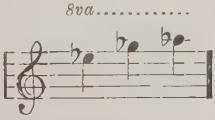


Fig. 305.

SECTION AND VERTICAL VIEWS OF INSTRUMENT SHOWN IN FIG. 304.

The companion piece [Cat. No. 109681, U.S.N.M.] is identical in size, shape, and conformation, and, strange to say, in musical notes also. The tones are not fixed, as each can be made to vary two or three degrees by changing the force of the breath. The tones produced by a breath of average force are indicated as nearly as may be in the accompanying scale:

They will be found to occur nearer the lower than the upper limit of their ranges. It should be observed that the capacity for variation possessed by each of these notes enables the skilled performer to glide from one to the other without interruption. This instrument is, therefore, within its limited range as capable of adjusting itself to any succession of intervals as is the trombone or the violin. I do not imagine, however, that the aboriginal performer made any systematic use of this power or that the instrument was purposely so constructed. It will be seen by reference to the scale that stopping the orifice in the end opposite the mouthpiece changes the notes half a tone, or perhaps, if accurately measured, a little less than that.

Specimen, Cat. No. 132754 (U.S.N.M.) is a smaller whistle, somewhat like the preceding in outline. The lower projection opposite the mouthpiece is, however, closed, and there are but two sound holes. The following notes are emitted:



[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, pp. 163, 164, figs. 245, 246.

Tubular or reed-shaped instruments.—The whistling mechanism corresponds to that of other forms. The chamber is tubular and the lower end open. Specimen, Cat. No. 109717 (U.S.N.M.) is a tube of painted ware without finger holes. The ground color is yellow, and there are

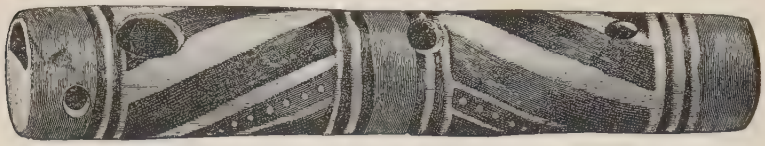


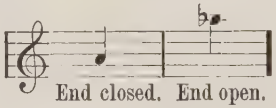
Fig. 306.

TUBULAR INSTRUMENT WITH TWO FINGER HOLES.

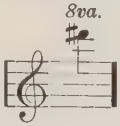
Chiriqui.

Cat. No. 109680, U.S.N.M. Natural size.

bands of red at each end and one midway between. With ordinary force in blowing, two notes nearly an octave apart are obtained—the lower with the end closed and the higher one with the end open:



End closed. End open.

By using greater force in blowing, the following note is emitted:

In fig. 306 is shown a tubular instrument with two finger holes. Fig. 307 is a section of the same. The cuts are reproduced from Mr. Holmes's paper,[1] and his description is here given:

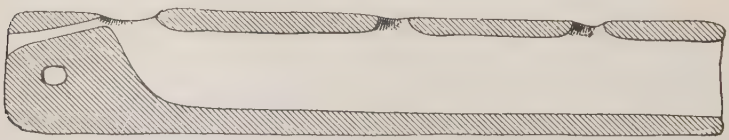


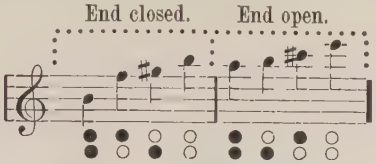
Fig. 307.

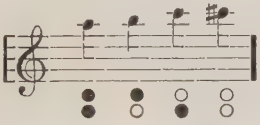
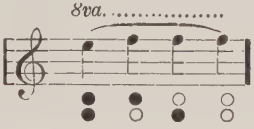
SECTIONAL VIEW OF FIG. 306.

Perhaps the most satisfactory instrument in the whole collection, so far as range is concerned, is shown in fig. 241 [our fig. 306], and a section is given in fig. 242 [our fig. 307]. It is capable of yielding the notes indicated in the accompanying scale: First a normal series of eight sounds, produced as shown in the diagram; and, second, a series produced by blowing with greater force, one note two octaves above

[1] Sixth Annual Report of the Bureau of Ethnology, 1884–85, pp. 161, 162, figs. 241, 242.

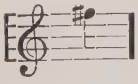
its radical, and the others three octaves above. These notes are difficult to produce and hold, and were probably not utilized by the native performer



Specimen, Cat. No. 133467 (U.S.N.M.). This instrument is identical with the preceding in shape, and also has two finger holes. The body is painted yellow and there are band decorations in red. With the end hole opened, the following notes can be obtained:

Closing the end and blowing with greater force will give two additional tones as seen in the accompanying scale:

The note F♯ is emitted with either hole stopped or with both holes open.

ECUADOR.

Specimen, Cat. No. 195590 (U.S.N.M.) represents an animal-shaped whistle from La Plata Island, Ecuador. It is rudely modeled in coarse gray-colored clay. The whistling device is placed at the back of the neck, where the hollow interior is divided by a thin partition. In this arrangement the head serves as an air chamber and the body a mouthpiece. Its one note, F♯, is here given:



BRITISH GUIANA.

Rattles, flutes, and trumpets.—The musical instruments in the Museum obtained from British Guiana can not properly be classed as prehistoric. It was thought, however, that descriptions of a few primitive instruments belonging to still existing tribes might prove interesting. It appears that only a limited variety of instruments are known to these people. Rattles and whistles or flutes made of different material seem

to have been all that can be so classed. Fig. 308, collected by W. C. McClintock, represents a rattle (*shak-shak*), made of thin strips of cane about one-eighth of an inch wide, and woven or plaited as in making baskets. At the lower end the strips are drawn together and lashed around a small spindle of wood with a cord of grass fiber, which forms the handle. The strips are of two colors, alternating as they are woven. The inside is furnished with small pebbles or seeds, which produce the rattling sound. This sound, however, is quite feeble, owing to the nature of the material which forms the chamber. A similar instrument in the Haldeman collection, Museum of Academy Natural Sciences, Philadelphia, is labeled as from the Carib Indians, British Guiana.

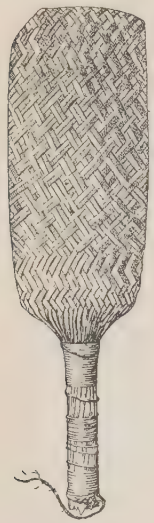


Fig. 308.

RATTLE (*shak-shak*) MADE OF PLAITED STRIPS OF CANE.

Carib Indians, British Guiana.

Cat. No. 54186, U.S.N.M.

⅓ natural size.

Specimen, Cat. No. 5374 (U.S.N.M.), presented by J. Varden, is a rattle made of a round gourd. It is painted dark brown and has four narrow slits or incisions about 4 inches long—two vertical and two horizontal—on opposite sides. A number of small pebbles inside produce the sound when shaken. A piece of wood 29½ inches long passes through the gourd and extends 15 inches beyond the upper part. The lower end or handle proper projects 11½ inches. The upper end is wrapped with a piece of flat sinnet made of cotton cord, to loops in which are attached bright-colored feathers of the parrakeet. An instrument from British Guiana identical with the foregoing is figured and described by Mr. J. G. Wood.[1]

In fig. 309 is presented a flute (*Wat-sa-pua*) or flageolet made from the thigh bone of the South American panther or jaguar. It is ornamented with incised bands and lines. The upper end is cut off square and

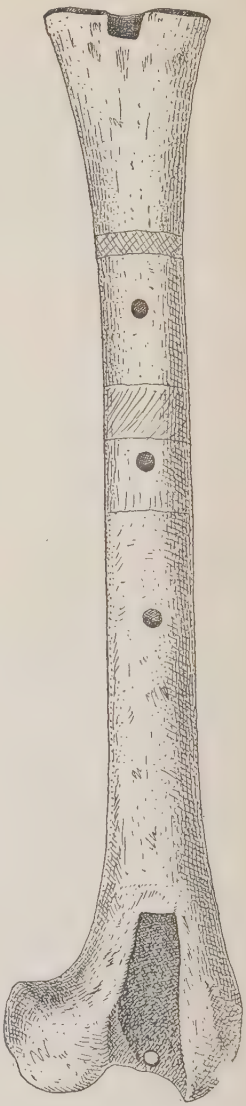


Fig. 309.

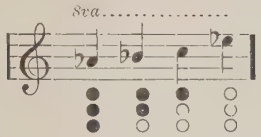
BONE FLUTE OR FLAGEOLET (*wat-sa-pua*).

British Guiana.

Cat. No. 4346, U.S.N.M.

⅔ natural size.

[1] Wood, J. G., The Natural History of Man, pp. 628, 629.

partly filled with resin to form the mouthpiece. It will be seen that the edge of the bone is cut out to form a sort of venthole. There are three finger holes and its musical capacity is shown in the accompanying scale:

This instrument is rather difficult to manipulate, and I was unable to obtain other notes by a different system of fingering. Gift of E. S. Brotherson.

A similar instrument with the same name is in the museum, Academy Natural Sciences, Philadelphia, from British Guiana, with a reference to "Brett's Indian tribes."

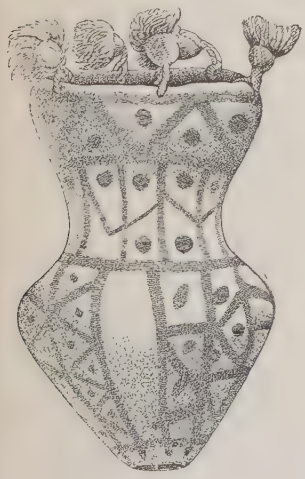


Fig. 310.
TRUMPET (?) OF POTTERY.
British Guiana.
Cat. No. 58603, U.S.N.M. ⅔ natural size.

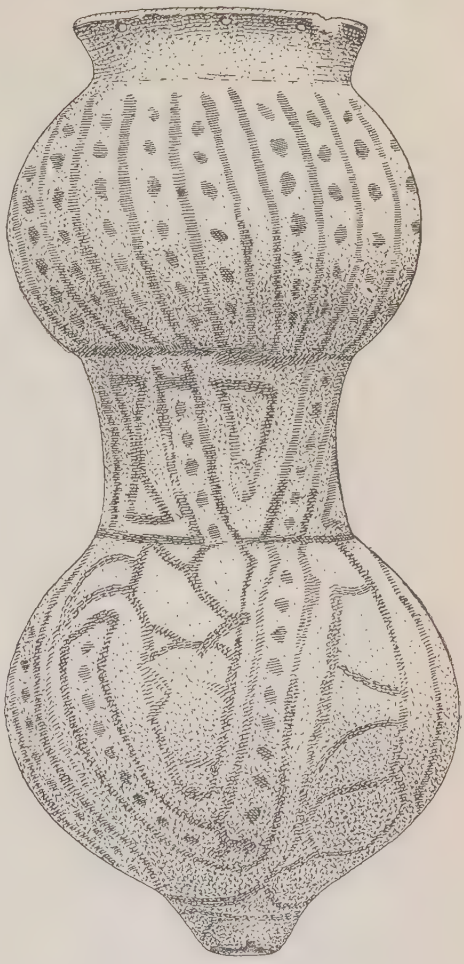


Fig. 311.
TRUMPET (?) OF POTTERY.
British Guiana.
Cat. No. 4361, U.S.N.M. ½ natural size.

Fig. 310 represents one of two small instruments of pottery from British Guiana presented to the museum by Col. Philip Figyelmesy. It has a vase-shaped outline with an aperture at the small end for a mouthpiece. The ware is soft and fragile. Upon a ground color of silver-gray are painted designs in black. Attached to the larger end are six tassels made of cotton cord which has been dyed brown. The label attached to one of these specimens reads as follows: "Earthen pipe used for blowing a noise during native dances."

Fig. 311 represents a larger instrument of the same class, but with a

difference in outline, as will be seen by referring to the sketch. Carl Engel mentions instruments of pottery somewhat like those just described, but of larger dimensions. Speaking of these,[1] he says:

The botuto, which Gumilla saw used by some tribes near the Orinoco (of which we engrave two examples) was evidently an ancient Indian contrivance, but appears to have fallen almost into oblivion during the last two centuries. It was made of baked clay and was commonly from 3 to 4 feet long; but some trumpets of this kind were of enormous size. The botuto with two bellies was usually made thicker than that with three bellies and emitted a deeper sound, which is described as having been really terrific. These trumpets were used on occasions of mourning and funeral dances. Alexander von Humboldt saw the botuto among some Indian tribes near the River Orinoco.

The small instruments just described may be a survival of the ancient botuto.

BRAZIL.

Bone whistles or flageolets.—According to Ewbank, the aboriginal Brazilians had instruments of bone made on the same principle as the bone whistles from the Pacific coast, heretofore described. Fig. 312 is

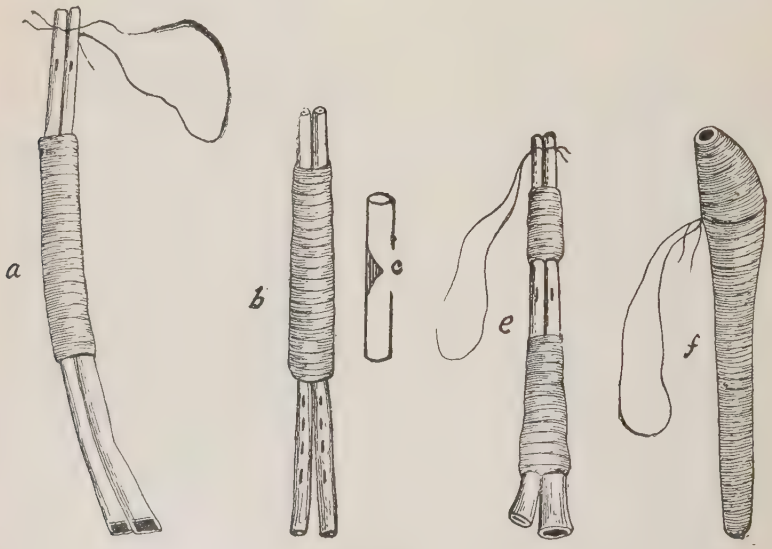


Fig. 312.

BONE FLUTES.

Brazil.

Thomas Ewbank, Life in Brazil, p. 121.

a reproduction of his drawings of a number in the museum at Rio Janeiro. The following descriptions are interesting as showing their similarity to the California instruments:

Double flutes were extensively used by the classical ancients, and here they are as constructed by American aborigines. The bones of which they are made are yel-

[1] Musical Instruments in the South Kensington Museum, pp. 74, 75.

low and jagged, and far from inviting to delicate lips. Their tones, however, are singularly soft and mellow.

Referring to the drawings, he says:

a represents the largest. Each bone is 12 inches long and three-eighths of an inch bore. They are united by twine neatly wound and worked. On the back are finger-holes, shown at *b*; these were stopped up; perhaps they were experimental additions of some Brazilian Pronomus. The construction of the sounding or whistle part is seen at *c*, a cone of resinous cement being secured immediately under the orifice. The ridge of cement rises to the center of the tube. The instrument is played by blowing through the upper end, as in a clarinet. *e* is a smaller flute, to be blown at either end. *f* has a swelled wooden mouthpiece, with no side opening. Dual bone flutes with finger holes are yet in use in the northern provinces, besides bamboo flutes and instruments with which the voices of wild beasts are imitated with singular accuracy.[1]

PERU.

Whistling bottles.—There are in the Museum a number of pottery bottles, obtained from ancient burial places in Peru, which are capable of emitting musical sounds. Many of these vessels are double, with an interior connection at point of contact, and those which are not double have two projections, one being the neck or mouth proper and the other terminating in the figure of a bird or animal which contains the whistling apparatus. The human form is also represented. It has been said that when pouring the water out, a sound imitating the note or cry of the bird or animal represented is produced.[2]

In experimenting with the bottles or instruments about to be described, the author has not been able to obtain any sound by pouring the water out. If the vessels are submerged in water, leaving the whistle above, their sounds or notes are given while the air is forced out by the incoming water. The clearest tone, however, is emitted by blowing, and the notes indicated in the accompanying scales were obtained in that way, using the open neck as a mouthpiece. The descriptions of these vessels by some writers (Bollært and von Tschudi) hardly give due credit to the aboriginal potter. The mechanism by which the sound or note is produced is something more than a hole or opening through which the air is forced, for it is constructed on the principle of the flageolet, as are the instruments from Mexico and Central America previously described. On some of these vessels two notes can be produced, varying from a semitone to a major third above the lowest tone (fig. 314). In all cases the upper note is made by using more force in blowing. In the specimens which are indicated as emitting but one tone, no amount of manipulation will give anything else, as more or less force in blowing causes the tone to break. As a result of these trials, I am inclined to believe that the objects here described were intended to serve a double purpose—as water bottles and also as whistles. Carl Engel,[3] in speaking of the ancient wind instruments of

[1] Ewbank, Life in Brazil, p. 121.

[2] Squier, E. G., Peru, Travel and Exploration in the Land of the Incas, p. 179.

[3] Musical Instruments in the South Kensington Museum, pp. 70, 71.

the South American Indians, evidently refers to this class. His description is here given:

Several of these barbarous contrivances scarcely deserve to be classed with musical instruments. This may, for instance, be said of certain musical jars or earthen vessels producing sounds, which the Peruvians constructed for their amusement. These vessels were made double, and the sounds imitated the cries of animals or birds. A similar contrivance of the Indians in Chile, preserved in the museum at Santiago, is described by the traveler S. S. Hill as follows: "It consists of two earthen vessels in the form of our india-rubber bottles, but somewhat larger, with a flat tube from 4 to 6 inches in length uniting their necks near the the top and slightly curved upward, and with a small hole on the upper side one-third the length of the tube from one side of the necks. To produce the sounds the bottles were filled with water and suspended to the bough of a tree, or to a beam, by a string attached to the middle of the curved tube, and then swung backward and forward in such a manner as to cause each end to be alternately the highest and lowest, so that the water might pass backward and forward from one bottle to the other through the tube between them. By this means soothing sounds were produced which, it is said, were employed to lull to repose the drowsy chiefs who usually slept away the hottest hours of the day. In the meantime, as the bottles were porous, the water within them diminished by evaporation, and the sound died gradually away."

Fig. 313.

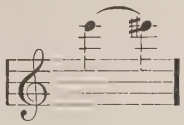
WHISTLING VASE, PAINTED WARE, ONE CHAMBER.

Peru.

Cat. No. 1398, U.S.N.M. $\frac{2}{3}$ natural size.

The remarks in the quotation regarding the production of sound, i. e., by partially filling the bottles with water and swinging them back and forth, applies equally as well to the vessels in the museum collection. This has been demonstrated by experiment. The musical notation of these instruments (?) has, however, as before stated, been obtained by blowing in the open neck. Perhaps, as Engel says, they "scarcely deserve to be classed with musical instruments."

Fig. 313 represents a vessel of painted ware with one chamber, collected by Admiral Charles Wilkes, United States Exploring Expedition. The ground color is dark yellow, upon which is laid in narrow stripes a red pigment of sufficient body to produce a slight relief effect. The spout or neck rises from one side of the vessel, and a handle curves from it to a projection opposite, representing a human figure sitting cross-legged. The handle is enlarged near where it joins the figure and forms an air chamber, which has a small opening, with the upper edge made thin and sharp. Opposite to this opening is a narrow slit

connecting with the interior of the vessel, through which a current of air is forced when blowing in the neck. The notes emitted are as follows:

The half tone difference is produced by using more force in blowing.

Specimen, Cat. No. 17382 (U.S.N.M.) is a one-chambered bottle of polished black ware from Peru, collected by Mr. J. V. Norton. The spout or neck is joined by a curved handle to a projection represent-

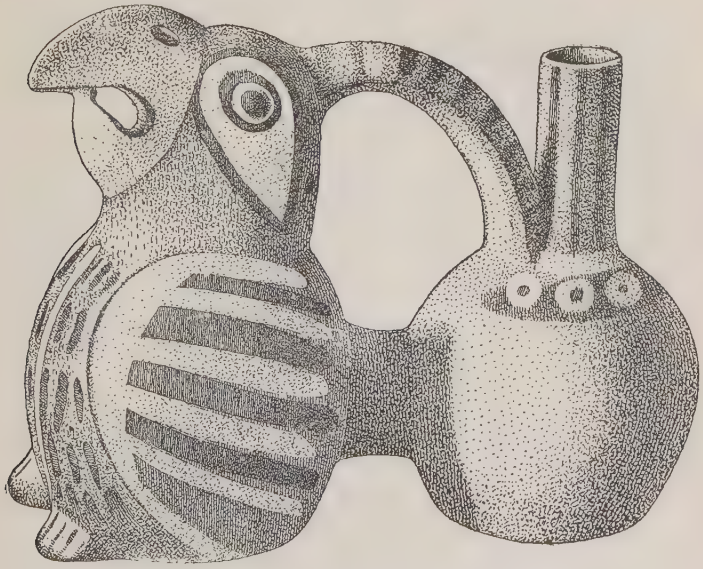


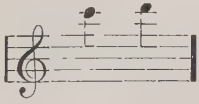
Fig. 314.

DOUBLE WHISTLING VASE, PAINTED WARE, PARROT.

Peru.

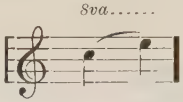
Cat. No. 88263, U.S.N.M. $\frac{2}{5}$ natural size.

ing a grotesque human figure. The handle is enlarged to form the whistling mechanism in the same manner as shown in fig. 313. Its two notes are as follows:



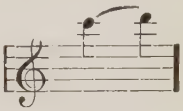
In fig. 314 (received from Mr. W. W. Evans) is presented a double vase of painted ware. One portion represents a parrot, the other is bottle-shaped, and the two are connected by a curved handle. The decorations

are in pale yellow and brown upon light-red ground color. The whistle is inside the head of the parrot. Its two notes are here given:



In this specimen the faintest increase or strength of breath will change the note from C to E, without giving, however, any intermediate sound. The result is a warbling, bird-like effect.[1]

Specimen, Cat. No. 32258 (U.S.N.M.), from Peru, received from Mr. W. W. Evans, is a double bottle of dark-brown color without painted decoration. The mouth of the bottle is connected by a curved handle to the figure of a bird upon the opposite chamber. The whistling apparatus is on the outside of the bird's head. Two notes are emitted, as follows:



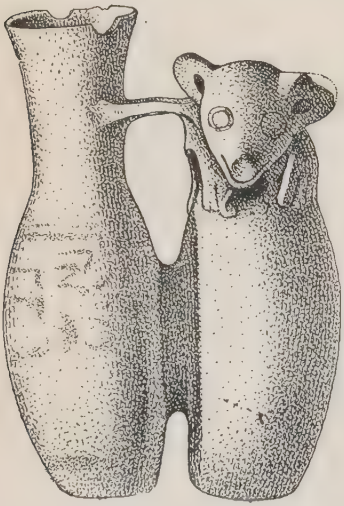


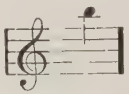
Fig. 315.

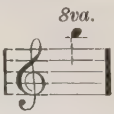
WHISTLING VASE, PAINTED WARE, ANIMAL FIGURE, TWO CHAMBERS.

Peru.

Cat. No. 32259, U.S.N.M. $\frac{5}{12}$ natural size.

Fig. 315 represents a double bottle of painted ware. The ground color is pale yellow and the decorations consist of conventional designs in brown and red. A figure of an animal is united to the neck of the bottle by a nearly straight handle. The shape of this vessel differs from all others, the chambers being more like a modern flask or canteen. Its one note is here given:



Specimen, Cat. No. 88210 (U.S.N.M.), from Peru, received from Mr. W. W. Evans, is a double bottle of painted ware. The ground color is light red, upon which are decorations in pale yellow and purple. One half of the vessel represents a grotesque human figure in a squatting position. Part of the headdress is in the form of a bird, and it contains the whistling mechanism. A curved handle projects from the back of the head connecting with the neck of the bottle. The one note emitted is quite weak:

In fig. 316 is shown a double bottle of painted ware. The decoration consists of stripes of red upon a pale yellow ground. A narrow band ornament in relief encircles the bottle proper. The connecting vessel

[1] A series of whistling vases (vases sifflants), identical with the one here described, is given by Wiener in "Perou et Bolivie," p. 628.

or chamber represents a human figure kneeling. The left hand holds to the mouth an instrument evidently intended to represent a syrinx or Pan pipe. A vessel similar to the foregoing, but without the whistling attachment, is described and figured by Wiener in "Perou et Bolivie" (p. 623). Attached to the right hand is a gourd-shaped object, possibly

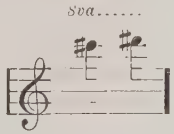
Fig. 316.

DOUBLE WHISTLING VASE, PAINTED WARE, BAND ORNAMENTED IN RELIEF, HUMAN FIGURE.

Peru.

Cat. No. 1399, U.S.N.M. $\frac{3}{4}$ natural size.

a rattle. The whistling apparatus is at the back of the head, where the curved handle which connects with the mouth of the bottle is joined. Its two notes are indicated in the accompanying scale:



Increased force in blowing produces the higher tone.

Another example of this class, shown in fig. 317, is a highly ornamented specimen of painted ware. The ground color is pale yellow and the decoration is in red, brown, and white. There are sunken panels on opposite sides of each bottle, in which are delineated an animal figure in relief. The animal represented is the same in each panel. A handle ornamented with painted geometric designs joins the two necks. Unfortunately the animal figure which contained the whistle is mutilated and no note can be produced.

Fig. 318 represents a vessel from an ancient grave in Peru, presented by the late secretary of the Smithsonian Institution, Prof. S. F. Baird. It is a double bottle of polished black ware. The two bodies of the vessel are ornamented with small indentations or eyes, which suggest

the idea that potatoes were intended to be represented. This does not seem unusual, for the ancient Peruvians reproduced in clay the figures

Fig. 317.

DOUBLE WHISTLING VASE, PAINTED WARE, ANIMAL FIGURE IN RELIEF.

Cheperi, Province of Pacasmayo, Peru.

Cat. No. 107548, U.S.N.M. $\frac{2}{5}$ natural size.

of men, animals, birds, fishes, shells, fruits, and vegetables. It is also well known that the potato was cultivated extensively in Peru at the time of the early discoveries.[1]

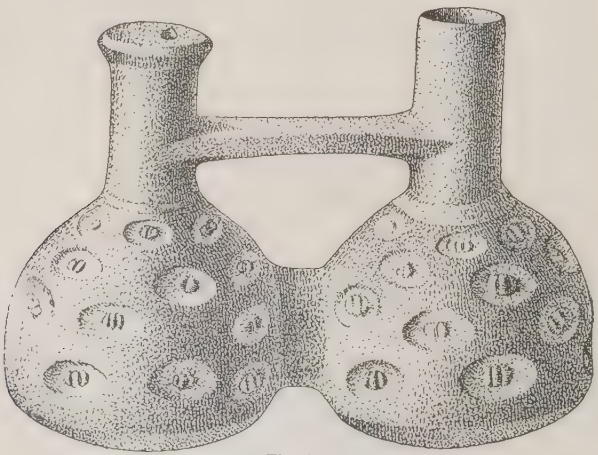


Fig. 318.

DOUBLE VASE, POLISHED BLACK WARE.

Ancient grave, Peru.

Cat. No. 15719, U.S.N.M. $\frac{2}{5}$ natural size.

The necks of the vessels are connected by a thin, straight handle.

[1] Prescott, Conquest of Peru, I, p. 141.

The usual animal or bird shaped figure containing the whistle is missing, therefore its musical capacity is unknown.

In fig. 319 is illustrated a double bottle of polished black ware. The figure of a bird is seated on one projection. At the back of its head is the air passage and venthole forming the whistle. On the connecting handle are two panel-like designs, with animals and birds represented in relief. Its two notes are indicated in the accompanying scale:

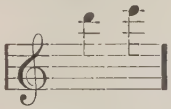


Fig. 320 represents a double bottle of polished black ware. The upper portions of the vessel are encircled by three bands, highly ornamented in relief. In the lower band birds are delineated, the next

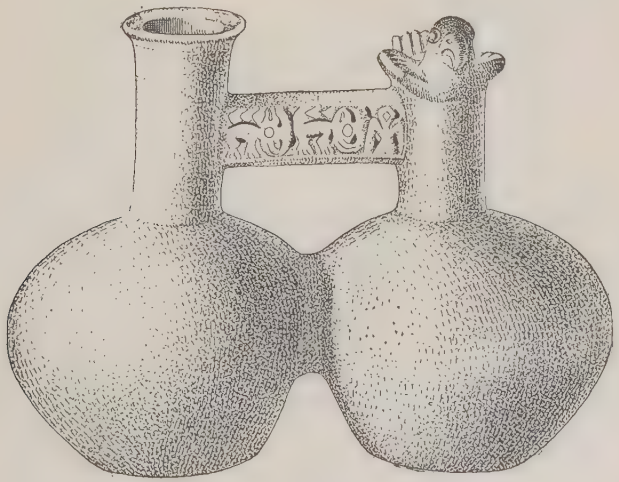
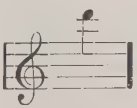


Fig. 319.

DOUBLE WHISTLING VASE, POLISHED BLACK WARE, FIGURE OF BIRD.

Peru, Tryon collection.

Cat. No. 148015, U.S.N.M. $\frac{2}{3}$ natural size.

higher fishes, and on the upper one the meander or Greek fret. On the connecting handle between the two projections are two panels, with conventional designs of animals, etc., also in relief. Seated upon one neck or projection is a monkey-like figure, with openings in the body, arranged in the usual manner, to produce a whistling sound or note, which is here given:

Specimen, Cat. No. 1405 (U.S.N.M.) was obtained in Peru by Admiral Charles Wilkes, United States Exploring Expedition. It is a double bottle of black ware. One portion represents an animal, with the

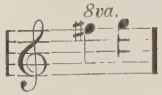
whistling mechanism in its head. There are small openings in the ears, nostrils, and mouth of the figure, which allow the air to escape, but the whistle itself can not be seen. Two notes can be obtained, as shown in the following scale—the higher note by increased force in blowing:

Specimen, Cat. No. 1347 (U.S.N.M.), from Peru, presented by Mr. W. Cartwright, is a double bottle of polished black ware, with a horizontal connecting handle between the two projections. Upon one of

Fig. 320.

DOUBLE WHISTLING VASE, BLACK WARE, BAND DECORATION IN RELIEF.

Cheperi, Province of Pacasmayo, Peru

Cat. No. 107552, U.S.N.M. ½ natural size.

these is represented a monkey-like figure. The bottom of one chamber is broken, and no sound can be produced.

Specimen, Cat. No. 68102 (U.S.N.M.) was exhumed from a mound or tomb near Catacaos, Peru, collected by Mr. W. F. Lee. It is bird shaped and made of dark gray colored clay, slightly polished. The head is parrot-like, and the plumage markings are indicated in conventional style by lines and dots in relief. The spout rises from the body near the tail, and is connected by a curved handle with the bird's head. Near this point of contact the handle is enlarged and contains the air passage, venthole, etc., which are necessary to obtain a sound or note. The specimen, however, is mutilated to such an extent that no musical sound can be produced.

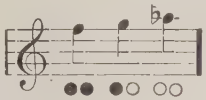
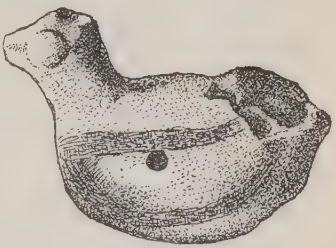
Bird-shaped whistles.—Fig. 321 represents the only example in the United States National Museum from Peru of a bird-shaped whistle identical in all respects with the Mexican and Central American instruments. It was presented by Col. J. S. Billings, surgeon, United States Army, and forms part of a series of objects obtained by him from an ancient grave in the mountains near Lima. It is of reddish clay, slightly polished. The painted decoration is quite simple, the wings only being outlined in black. There are two sound holes, one on each side, near the middle of the body. Part of the tail, which contained the mouthpiece, is wanting, but enough remains to obtain the musical compass of the instrument, which is here given:



Fig. 321.

POTTERY WHISTLE, BIRD-SHAPED.

Ancient grave near Lima, Peru.

Cat. No. 140975, U.S.N.M. ⅞ natural size.

Specimen, Cat. No. 107434 (U.S.N.M.) is a bird-shaped whistle or toy of coarse clay, painted black and polished. The plumage markings are indicated by incised lines alternately touched with white and red pigments. It was obtained from an ancient grave near Ancon, and presented by Mr. W. H. Jones. The body of the bird is hollow, and there is but one hole, placed in the back. To produce a sound it must be

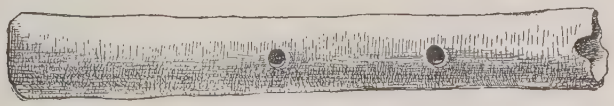
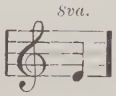


Fig. 322.

FRAGMENT OF A BONE FLAGEOLET.

Ancient grave near Lima, Peru.

Cat. No. 140983, U.S.N.M. ¾ natural size.

blown in the same manner as a flute. It may not have been intended for anything but a call or signal. The following note is emitted:

Specimen, Cat. No. 140976 (U.S.N.M.) is a broken bird-shaped whistle of the same material and details of construction as the one just described. It was obtained by Colonel Billings from the grave near Lima, and found with the bird-shaped instrument shown in fig. 321.

Bone flute.—An interesting object of bone from the same grave is represented in fig. 322. It is part of the ulna of the Brown Pelican (*Pelecanus molinæ*). The ends of the bone have been cut off and the

cellular portion removed. In its original condition this instrument was probably furnished with four finger holes, as were some of the whistles or flutes from the California islands previously mentioned (p. 570, fig. 210), and to which it bears a remarkable resemblance. This one is unfortunately broken off at the third hole. Wiener,[1] speaking of this class of instruments, says:

> The most curious objects of this kind are, without contradiction, the flutes of the tibia or other bones of birds, many times covered with designs (incised).

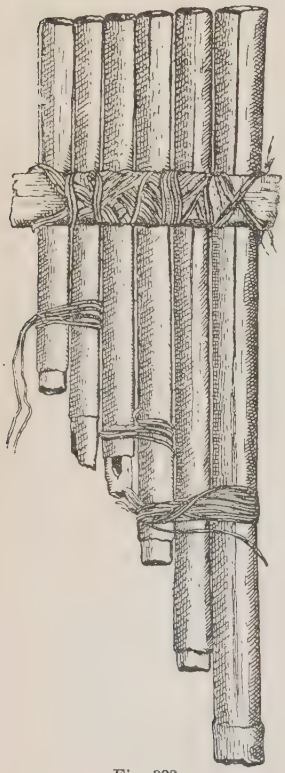


Fig. 323.

SYRINX OR PAN-PIPE (*huayra-puhura*), COMPOSED OF SIX REEDS.

Grave near the beach at Arica, Peru.

Cat. No. 136869, U.S.N.M. ⅛ natural size.

Syrinx or Pan-pipes (reed and stone).—Two interesting specimens made of hollow reeds, representing the syrinx or Pan-pipes (*huayra-puhura*) are preserved in the National Museum. They were obtained by Ensign W. E. Safford, United States Navy, from ancient burial places near Arica, Peru. The reeds are of graduated lengths, lashed together by threads and held in place by a piece of split reed fastened transversely to their length. The reeds are so crushed and mutilated that a positive sound can not be obtained. These instruments are illustrated in figs. 323 and 324. One is composed of six reeds, the other of five. In the graves, associated with them, were flint arrowheads, stone sinkers, copper knives and fishhooks, objects of bone, wood, and pottery, woven matting, and the mummified body of a young man. That instruments of this kind are of ancient origin and were in use

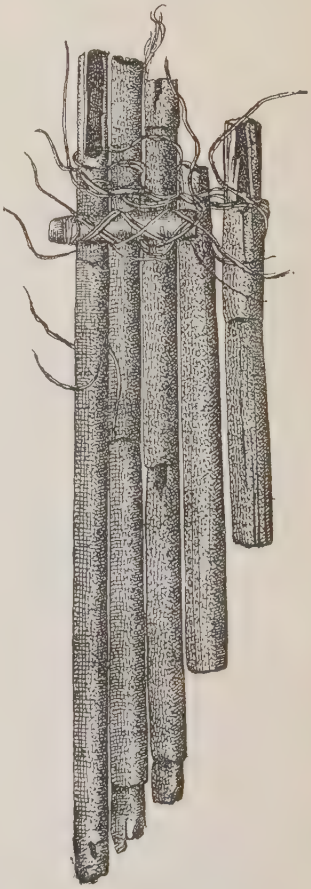


Fig. 324.

SYRINX OR PAN-PIPE, COMPOSED OF FIVE REEDS.

Grave near the beach at Arica, Peru.

Cat. No. 129385, U.S.N.M. ⅛ natural size.

[1] Perou et Bolivie, p. 581.

by the Peruvians before the Spanish conquest is shown by the historian Garcilasso de la Vega.[1] Of their music he says:

In music they arrived to a certain harmony, in which the Indians of Colla did more particularly excel, having been the inventors of a certain pipe made of canes glued together, every one of which having a different note of higher and lower, in the manner of organs, made a pleasing music by the dissonancy of sounds, the treble, tenor, and bass, exactly corresponding and answering to each other; with these pipes they often played in concert, and made tolerable music, though they wanted the quavers, semiquavers, airs, and many voices which perfect the harmony among us. They had, also, other pipes which were flutes, with four or five stops, like the pipes of shepherds.

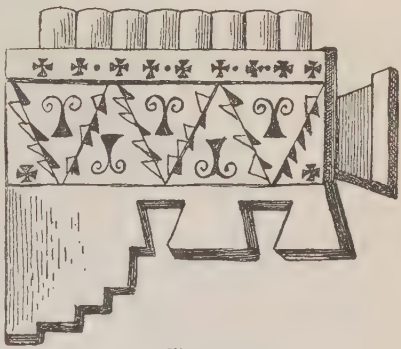
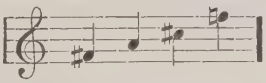
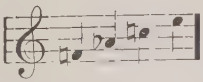


Fig. 325.
SYRINX OF STONE.
Peruvian grave.
Engel, Musical Instruments, p. 66.

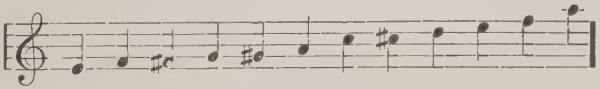
Rivero and Von Tschudi[2] mention similar instruments made of reeds of cane or stone and adorned sometimes with needlework.

Fig. 325 represents an instrument made of stone. It is reproduced from Engel's drawing,[3] and his description here follows:

Another huyara-puhura, likewise still yielding sounds, was discovered placed over a corpse in a Peruvian tomb, and was procured by the French general, Paroissien. This instrument is made of a greenish stone, which is a species of talc, and contains eight pipes. In the Berlin Museum may be seen a good plaster cast taken from this curious relic. The height is 5⅜ inches, and its width 6¼ inches. Four of the tubes have small lateral finger-holes, which, when closed, lower the pitch a semitone. These holes are on the second, fourth, sixth, and seventh pipes, as shown in the engraving. When the holes are open, the tones are:

and when they are closed:



The other tubes have unalterable tones. The following notation exhibits all the tones producible on the instrument:



The musician is likely to speculate what could have induced the Peruvians to adopt so strange a series of intervals; it seems rather arbitrary than meditated.

The Peruvians tied knots in strings to record their music.[4]

[1] Commentaries of Peru: English translation by Sir Paul Rycaut, Kt., London, 1688, Book II, p. 84.

[2] Peruvian Antiquities, English translation by Francis L. Hawks, D. D., LL. D., p. 143, et seq.

[3] Musical Instruments, p. 66.

[4] Rowbotham, History of Music, III, p. 198, citing de la Vega, II, p. 27.

CONCLUSION.

Certain differences of opinion exist among historians of music as to the scale adopted by primitive peoples in their earliest efforts. One class thinks it finds in the laws of sound a relationship between notes of different pitch, which harmonize with each other and make a concord of sweet sounds, and demonstrates a scale natural to all men and therefore universal, applying as well to the savage as to the enlightened; that is to say, they believe that when the savage has become sufficiently practiced in music to employ a scale of any kind, he will use that belonging to modern and civilized music because that scale is natural to man. Other persons deny this, and express their belief that primitive peoples either did not recognize this concord, or else did not desire it.

These differences of opinion have not been adjusted. When one party shows primitive instruments on which the modern scale can be produced, or shows primitive music written on the modern staff, they are met with the assertion that this is, or may be, the result of straining the instrument to produce the given note.

Neither myself nor my associate, Mr. Upham, have taken sides in this controversy, recognizing our rôle to be that of gathering facts rather than indulging in speculation, that our facts may be used by both parties, thus serving in some degree to elucidate these disputed questions.

Great care has been employed in ascertaining the tones or pitch indicated in the staves, that they should represent the normal scale of each instrument. They could be manipulated so as to give a tone higher or lower than normal. Particular pains have been taken to represent upon the staff the notes obtained, by using average force in blowing, and to avoid the temptation to raise or lower the pitch, in order that the intervals might be more easily represented on the staff or more satisfying to the ear.

The fact that it is rare to find two instruments from a given locality which produce the same tones indicates at least that their construction (musically) was not based on any established or recognized scale. With most of them the intervals and scale appear to have been purely accidental. What results might be obtained if all prehistoric instruments could be brought together and studied it is impossible to say.

CHESS AND PLAYING-CARDS.

CATALOGUE OF GAMES AND IMPLEMENTS FOR DIVINATION EXHIBITED BY THE UNITED STATES NATIONAL MUSEUM IN CONNECTION WITH THE DEPARTMENT OF ARCHÆOLOGY AND PALEONTOLOGY OF THE UNIVERSITY OF PENNSYLVANIA AT THE COTTON STATES AND INTERNATIONAL EXPOSITION, ATLANTA, GEORGIA, 1895.

BY

STEWART CULIN,

Director of the Museum of Archæology and Paleontology, University of Pennsylvania.

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NOTE.

The following work has grown from a simple catalogue into its present proportions in an endeavor to illustrate the distribution of certain games, and by comparison elucidate their original significance. In the American part an attempt has been made to describe as far as possible the implements for games of the types mentioned, in American museums. Additions and corrections, to be incorporated in a subsequent publication, will be gratefully acknowledged by the author.

STEWART CULIN.

UNIVERSITY OF PENNSYLVANIA,
Philadelphia, August, 1897.

CHESS AND PLAYING-CARDS.

By Stewart Culin,

Director of the Museum of Archæology and Paleontology, University of Pennsylvania.

INTRODUCTION.

The object of this collection[1] is to illustrate the probable origin, significance, and development of the games of chess and playing-cards. Following up the suggestion made to the writer by Mr. Frank H. Cushing, they are both regarded as derived from the divinatory use of the arrow, and as representing the two principal methods of arrow-divination. Incidental to the main subject, various games and divinatory processes having a like origin, although not leading directly to chess or cards, are exhibited, as well as specimens of each class from various countries.

The basis of the divinatory systems from which games have arisen is assumed to be the classification of all things according to the Four Directions.[2] This method of classification is practically universal

[1] This collection, for which a diploma of honor and gold medal were awarded at the Atlanta Exposition, was subsequently placed on exhibition in the U. S. National Museum, where it has since been augmented by many of the additional games described in this catalogue.—Editor.

[2] Some idea of the extent to which the classification of things according to the world quarters was carried in Eastern Asia may be obtained from the numerical categories in the second part of Mayer's Chinese Reader's Manual, from which the following examples are taken:

DIRECTIONS.	SEASONS.	COLORS.	ELEMENTS.	PLANETS.	METALS.	GRAINS.
North.	Winter.	Black.	Water.	Mercury.	Iron.	Pulse.
East.	Spring.	Green.	Wood.	Jupiter.	Lead, tin.	Corn.
South.	Summer.	Red.	Fire.	Mars.	Copper.	Millet.
West.	Autumn.	White.	Metal.	Venus.	Silver.	Hemp.
Middle.		Yellow.	Earth.	Saturn.	Gold.	Rice.

I append, for purpose of comparison, a list of some of the corresponding categories as they exist in the pueblo of Zuñi, New Mexico, kindly furnished me by Mr. Cushing.

DIRECTIONS.	SEASONS.	COLORS.	ELEMENTS.
North.	Winter.	Yellow.	Air (wind or breath).
West.	Spring.	Blue.	Water.
South.	Summer.	Red.	Fire.
East.	Autumn.	White.	Earth (seeds of).
Upper.	Day.	Many-color.	Waking or life condition.
Lower.	Night.	Black.	Sleeping or death condition.
Middle.	Year.	All colors.	All elements and conditions.

It should be observed that the connotations of color and direction vary from the above and from each other among the different American tribes, between Aztec and Maya, and between the different Mexican chroniclers.

among primitive peoples both in Asia and America. In order to classify objects and events which did not in themselves reveal their proper assignment resort was had to magic. Survivals of these magical processes constitute our present games. The identity of the games of Asia and America may be explained upon the ground of their common object and the identity of the mythic concepts which underlie them.

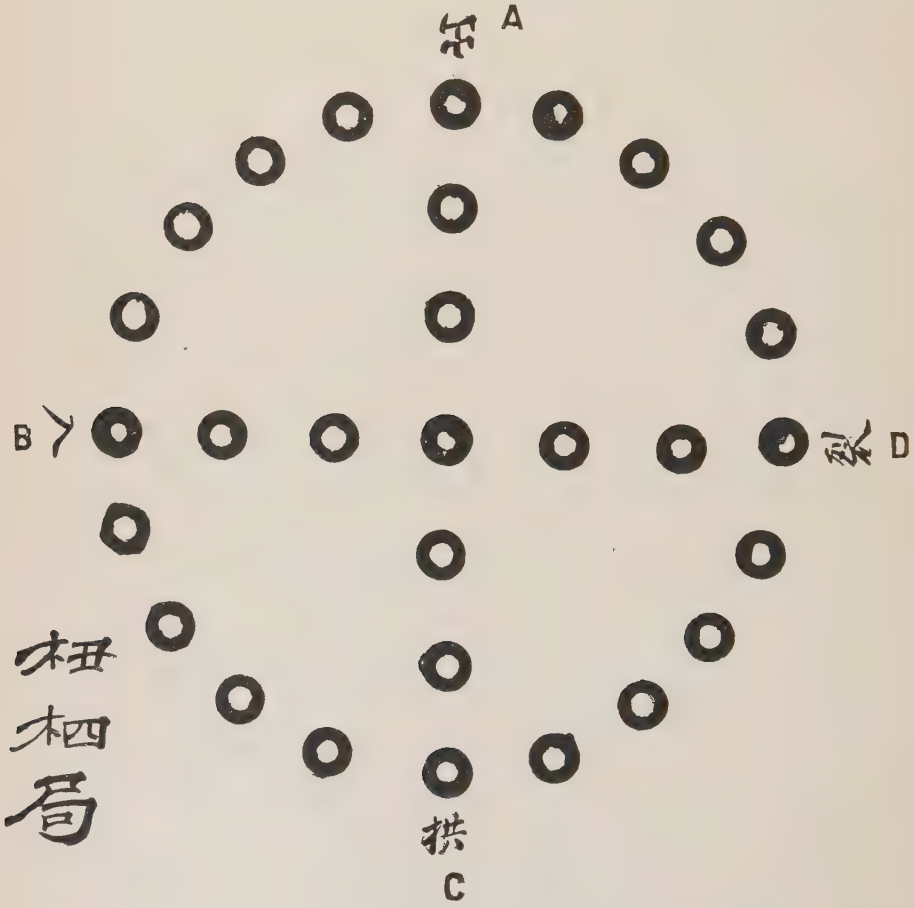


Fig. 1.

NYOUT HPAN. NYOUT BOARD.

Korea.

Cat. No. 18569, Museum of Archæology, University of Pennsylvania. From Korean Games.

These concepts, as illustrated in games, appear to be well nigh universal. In the classification of things according to the Four Quarters we find that a numerical ratio was assumed to exist between the several categories. The discovery of this ratio was regarded as an all-important clue. The cubical dotted die represents one of the implements of magic employed for this purpose. The cubical die belongs, however,

to a comparatively late period in the history of games and divination. The almost universal object for determining number, and thence by counting, place or direction, is three or more wooden staves, usually flat on one side and rounded upon the other. Numerical counts are attributed to their several falls. A typical game in which these staves are employed is found in No. 1—the Korean game of *Nyout*.

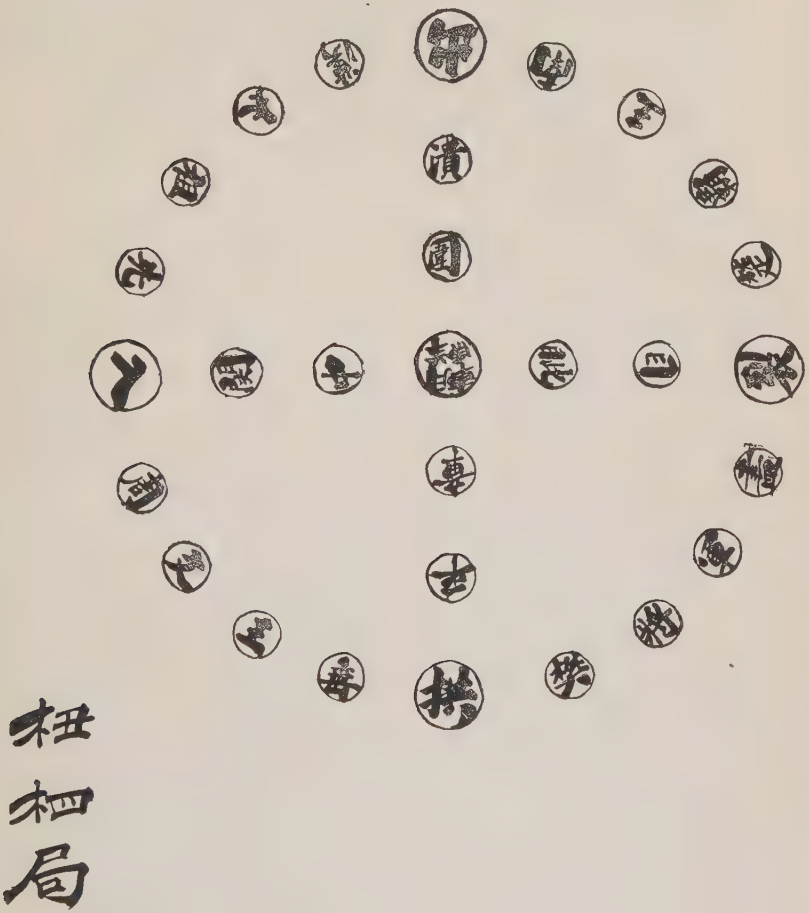


Fig. 2.

NYOUT HPAN. NYOUT BOARD.

Inscribed with Chinese verse.

Korea.

Cat. No. 16487, Museum of Archæology, University of Pennsylvania. From Korean Games.

1. NYOUT. Korea.

(*a*) Board and staves.[1]

[1] Nos. 16487, 16898, Mus. Arch., Univ. Penn. The board exhibited (fig. 1) is painted upon a sheet of Korean paper, 22½ by 26 inches, and was made for the author by Mr. Pak Young Kiu, secretary of the Royal Korean Commission to the World's Columbian Exposition, Chicago, in the summer of 1893. Another (fig. 2) has Chinese charac-

(*b*) Reproduction of native picture; Korean boys playing *Nyout.*[1]

The national game of Korea. Two, three, or four persons play, moving objects used as men around a circuit, according to throws made with four blocks of wood used as dice. The circuit (fig. 1) is marked with twenty-nine points, twenty of which are arranged equally distant in a circle, within which is a cross composed of nine stations. The blocks ordinarily used are called *pam-nyout* or "chestnut *nyout*" (Plate 1, fig. 1), white and flat on one side and black and convex on the other. The pieces or men, called *mal* (Chinese, *má*), "horses,"[2] may consist of any convenient stick or stone. The throws count as follows:

4 white sides up, *nyout*, =4
4 black sides up, *mo*, =5
3 white sides up, *kel*, =3
2 white sides up, *kăi*, =2
1 white side up, *to* =1

A throw of *nyout* or *mo* entitles the player to another throw, which he makes before moving his piece. The one who shall play first is determined by throwing the blocks, the highest leading. The players enter their men on the mark next on the left of the large circle at the top of the diagram, and move around against the sun. The object of the game is to get from one to four horses around the circuit and out again at the top. If a player throws so that one of his men falls upon another of his own he may double up the two pieces and thereafter take them around as one piece, they counting as two in the game. If a player's piece falls upon an opponent's the latter is said to be "caught," and is sent back to the beginning, and must be started again as at first. The captor is given another throw. Partners are permitted to move each other's pieces. In opening the game, if a player's man falls upon the large circle B, on the left, he returns to the goal by the radii B E, E A. If he overthrows the mark B he must continue on to C. At this point he returns by the diameter C A, but if he overthrows C he must continue on to D and around the circuit to A, the going-out place.

---

ters, reading as four lines of a verse, inscribed in the circles. Children frequently play upon a circuit drawn upon the ground. In the picture of the game (Plate 2) the boys are represented as throwing the blocks through a cuff, which one of them has removed for the purpose. This is done to render the result of the throws more a matter of chance than of skill, and is a substitute for a ring of straw, about 2 inches in diameter, affixed to the end of a stick about a foot long, which is stuck in the center of the ring for the same purpose. The selection of the wood for the sticks is not a matter of individual caprice. They are usually made of the wood of a thick bushy tree, like the prunus, called *ssa-ri*, used in China for bows, whence the game is called *sa-ri-nyout*. Another wood, *pak-tal-na-mou*, defined as a very hard wood of which mallets are made, is sometimes used, but the former is preferred.

[1] Stewart Culin, Korean Games, Philadelphia, 1895.

[2] The term *má*, or horses, applied to men or pieces in a game, is of high antiquity in China, and was also given to the counters employed in the classical Chinese game of *Tau ú* or "pitch pot" (pitching arrows or arrow-lots into a pot), described in the Li Ki.

EXPLANATION OF PLATE 1.

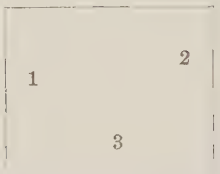
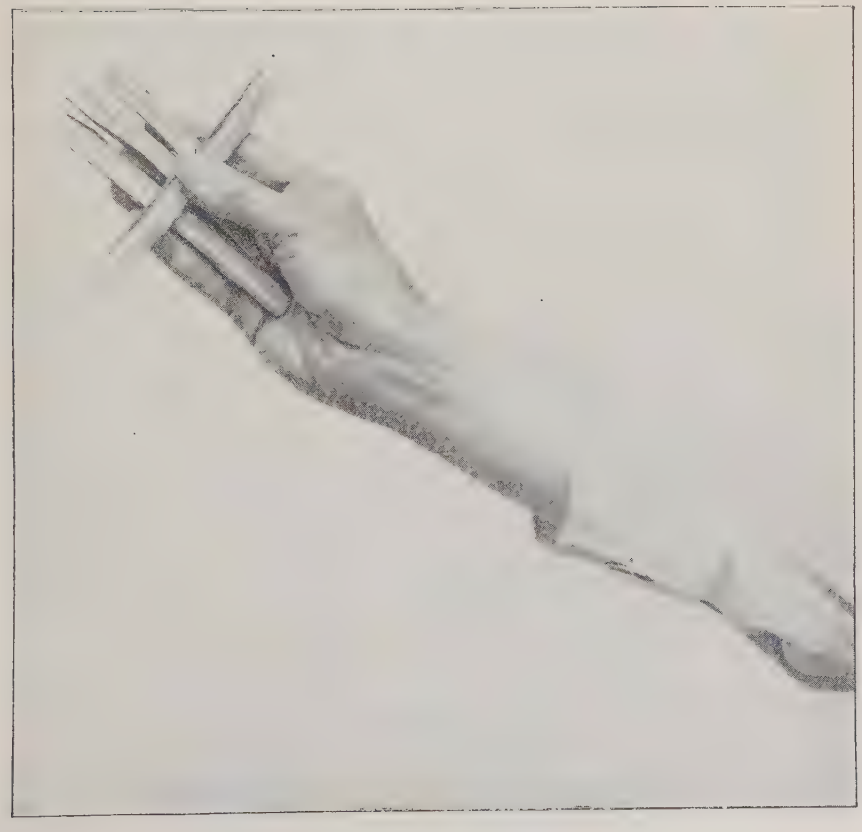


Fig. 1. PAM-NYOUT. Length, $\frac{3}{4}$ inch.
(Cat. No. 17608, Mus. Arch., Univ. Penn. Korea.)

Fig. 2. TJYANG-TJAK-NYOUT. Length, 5 inches.
(Cat. No. 17607, Mus. Arch., Univ. Penn. Korea.)

Fig. 3. METHOD OF HOLDING LONG NYOUT STICKS.



IMPLEMENTS USED IN PLAYING GAME OF NYOUT.

KOREAN BOYS PLAYING NYOUT.
From painting by native artist, reproduced in Korean Games.

Children and gamblers in the cities commonly use short blocks. In the country, long blocks or staves, called *tjyang-tjak-nyout* (Plate 1, fig. 2), are employed. These are usually about 8 inches in length. In throwing them, one is often placed across the others, which are held lengthwise in the hand by the thumb, with the ends resting on the fingers (Plate 1, fig. 3). The game is played in the country by all classes, but only from the fifteenth of the twelfth to the fifteenth of the first month.

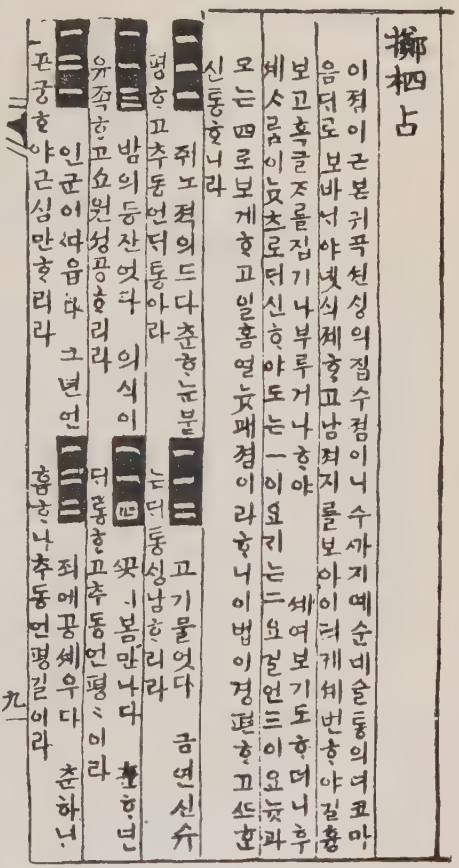


Fig. 3.

FIRST PAGE OF TJYEK-SĂ-TJYEM.

Korean handbook for divination with staves.

In the author's collection. From Korean Games.

The names applied to the throws are not Korean or Chinese, but are numerals which correspond closely with the corresponding numerals of certain Ural-Altaic stocks.[1]

References to games played with staves, of the same general character as *Nyout*, occur in Chinese literature, where they are attributed to a foreign origin.

It is customary in Korea to use the long blocks at the fifteenth of first month for the purpose of divination. Early in this month a small book is sold in the markets of Seoul to be used in connection with them. The players throw the staves three times, noting the number that is counted for the throw at each fall. The series three numbers is then referred to the book upon the several pages of which are printed in Chinese characters all the various permutations of

[1] Dr. Daniel G. Brinton, who kindly compared them, tells me that the first three have rather close analogies with the Ural-Altaic, while the "four," and perhaps the "five," seem connected with the Samoyed:

KOREAN.	URAL-ALTAIC.
1. *To* or *ta*.	*it, té* (Finnish, Lappish).
2. *Kăi* or *ká*.	*kah* (Finnish, Lappish).
3. *Kel* or *kol*.	*kol* (Finnish, Lappish).
4. *Nyout*.	*tet* (Samoyed).
5. *Mo*.	*sumula* (Samoyed).

the numbers, taken three at a time, with Korean text explanatory of their significance. A reproduction of the first section, entitled *Tjyek-să-tjyem* (Chinese, *chák sz' chím*) "Throwing Nyout Divination," from a little Korean handbook, *Tjik-syeng-pep* (Chinese, *chik sing-fát*) "Correct Planet Rule" is given in fig. 3. The numbers represented by the throws are from "one" to "four" in sixty-four permutations, from which it will be seen that only three staves are used. *Nyout* or "four" is the highest throw, and an explanation is thus given of the name of the game.

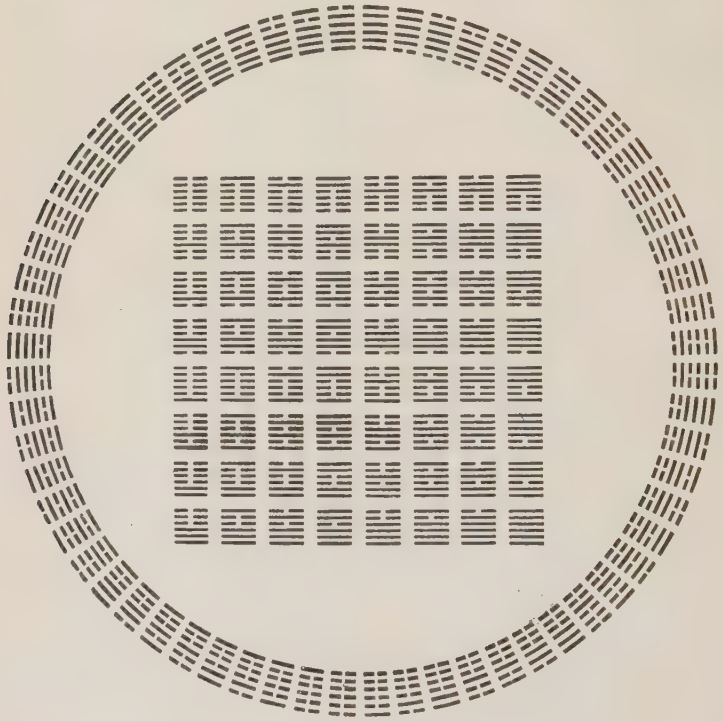


Fig. 4.

THE SIXTY-FOUR HEXAGRAMS.

China.

After Legge.

The Chinese *Book of Divination* consists of sixty-four diagrams, *kwá*, composed of combinations of unbroken ——— with broken lines —— ——, six being taken at a time, and the resulting diagrams being known as the sixty-four *kwá* (fig. 4). Each of these diagrams is designated by a name and accompanied by a short explanatory text. Now the sixty-four hexagrams are regarded as an expansion of the eight trigrams (fig. 5), called the *pát kwá* or eight *kwá*, formed by combining the same unbroken and broken lines, three at a time. The unbroken lines in the diagram are called *yéung*, "masculine," and the broken lines *yam*, "feminine." It is apparent that if the two sides of the Ko-

rean blocks be regarded as representing the unbroken or masculine lines and the broken or feminine lines the trigrams will form a record of the throws when three blocks are used, and the hexagrams when six blocks are taken. From this I regard the divinatory use of the *nyout* blocks in connection with the handbook as illustrating the origin of the Chinese *Book of Divination*, to which the handbook presents an almost perfect parallel.[1] As it appears from the foreign names of the stave-throws in Korea that the system is foreign and non-Chinese, confirmation is afforded of the theory of the foreign origin of the Book of Divination advanced by Professor Terrien de Lacouperie. A detailed account of *nyout* is given by the writer in his work on Korean Games.

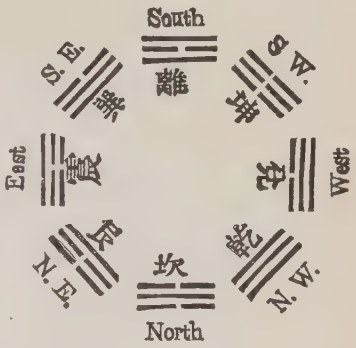


Fig. 5.

THE PÁT KWÁ OR EIGHT DIAGRAMS, ACCORDING TO FUH-HI.

China.

From Mayer's Chinese Reader's Handbook.

The game of *nyout* may be regarded as the prototype of a large class of common games, such as the Game of Goose, Backgammon, Pachisi, and Chess. It is clearly divinatory in its associations, the diagram representing the world with its four quarters. The *number*, by means of which *place* is determined, is discovered by tossing the blocks or staves.

The assumption that the *nyout* staves were derived from arrows, suggested by Mr. Cushing, is based upon evidence furnished by corresponding American games; for example, in the Kiowa game of *Zohn ahl*, No. 3, where three of the staves bear marks like arrow feathering. In throwing the long *nyout* staves it is customary to hold three crosswise over the other (Plate 1, fig. 3), in somewhat the same manner as in the Zuñi game of *Shó-lí-we*. (Compare fig. 112.)

2. GAMING ARROWS.[2] Kiowa Indians. Indian Territory, United States.

[1] I am informed that in the system of fortune-telling known in Japan as *yeki* (No. 65), in which splints are ordinarily used, three small blocks are sometimes tossed to determine the diagrams. In this method, known as *Arai shin yeki*, from *Arai*, the name of the reputed inventor, three rectangular blocks, called *sangi*, about 3 inches in length, made of some hard wood—cherry, or, preferably, ebony—are employed. Two of the opposite long sides are plain. The two other opposite faces are marked with vermilion ink in Chinese characters: On one, *T'ién*, "Heaven;" one, *Tí*, "Earth," and the other *Yan*, "Man." The determinations are made according to the positions in which the marked sides fall one to another, which are referred to a special treatise. Another similar method employed in Japan, also attributed to Arai, is by means of three ancient "cash" or coins, which are tossed from a tortoise shell. My informant, Mr. K. Wadamori, of Tokio, himself a *yeki gakusha* or "*yeki* scholar," tells me that dots are frequently employed in Japan in noting the diagrams, as in the Malagassy *sikiddy*.

[2] Lent by Stewart Culin. Reproductions made by Mr. Cushing from originals in the United States National Museum (Cat. No. 152913). Collected by James Mooney.

Six arrows made of single pieces of maple wood, 29¼ inches in length (Plate 3). The heads are carved and painted. According to the collector, Mr. James Mooney, they are thrown with the hand like a javelin, and the player who throws farthest wins. It is a man's game.

It is probable that these arrows were actually used in a game extremely common among the Plains Indians. It consists in the players tossing arrows in turn at a mark. The object of each player after the first is to throw his arrow so that it will lie across the arrow or arrows

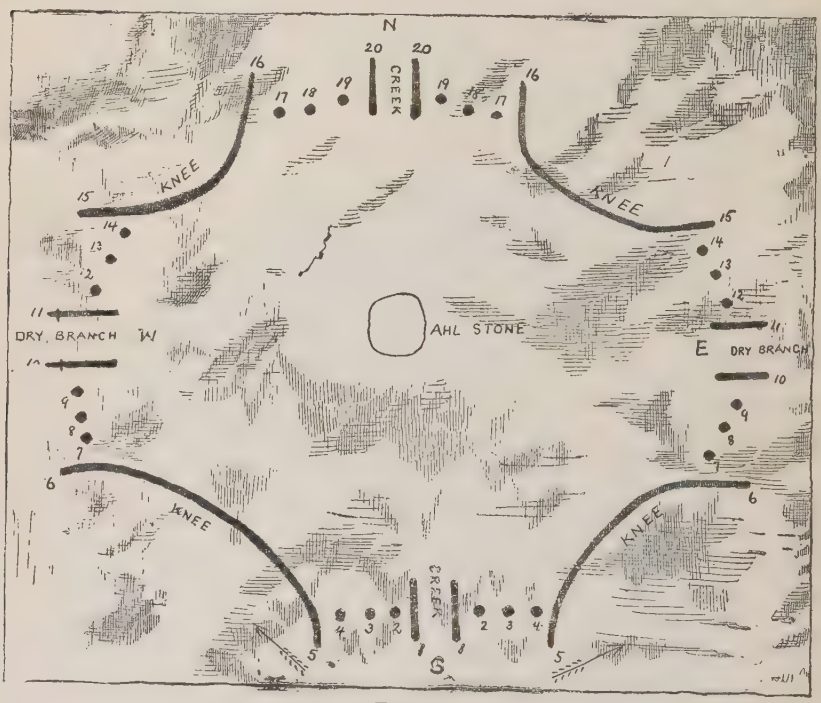


Fig. 6.

CLOTH FOR ZOHN AHL.

Kiowa Indians, Indian Territory.

Cat. No. 16535, Museum of Archæology, University of Pennsylvania.

that have been tossed before.[1] Mr. Cushing informs me that the counts usually depend upon whether the tossed arrow falls upon the other at its head, middle, or foreshaft.

[1] Mr. E. W. Davis has given me an account of this game, as seen by him played by the Apache of Geronimo's band in 1889, in St. Augustine, Florida. He states that the mark was about 10 feet away. "The arrows were tossed point first. The first man to throw was required to land on the mark. If he did so he got his arrow back. Once an arrow in the field, the object of the next player was to toss his arrow so that it should cross the first thrown, and so on through the crowd. I have seen as many as six play, and often all would toss around without anyone winning. In this case the arrows on the ground remained in the pot, so to speak. The play then went on, each player winning as many arrows as he could succeed in crossing with his own, until the whole number was removed."

GAMING ARROWS.
Length, 29¼ inches.
Kiowa Indians, Indian Territory.
Cat. No. 159913, U.S.N.M.

The incised designs, painted red, yellow, green, and blue, are in part easily recognizable as the calumet with primer, bow and arrow, the lightning, and the symbols of the Four Directions on the uppermost arrow (Plate 3), which are painted from left to right with the colors red, green, blue, and yellow. Mr. Cushing identified others as the war staff, or standard, and shield; day or dawn signs with turkey tracks; day signs with stars; horse tracks, and the "man" sign. Mr. Mooney, in reply to my inquiry, informed me that the Kiowa attach no special significance to these carved arrows, and were unable to explain the designs.

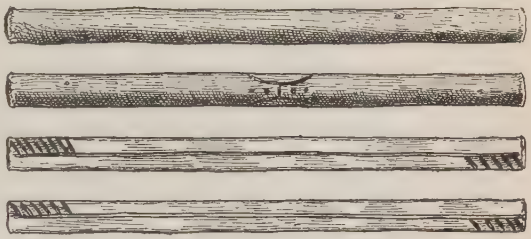


Fig. 7.

STAVES FOR ZOHN AHL.

Length, 10 inches.

Kiowa Indians, Indian Territory.

Cat. No. 16536, Museum of Archæology, University of Pennsylvania. From Korean Games.

These arrows, carved and painted with cosmical emblems, are here introduced to illustrate the use of a veritable arrow, specialized for the purpose of a game, among the American Indians.

3. ZOHN AHL,[1] commonly known as the "Awl Game." Kiowa Indians, Indian Territory, United States.

(*a*) A cloth, called the "awl cloth."

(*b*) Two awls.

(*c*) Flat bowlder, called the "awl stone."

(*d*) Four prepared staves, called *ahl* or "wood."

(*e*) Eight other sticks, to be used as counters.[2]

The "awl cloth" (fig. 6) is divided into points by which the game is counted. The curved lines upon it are called "knees," because they are like the knees of the players.

The space between the parallel lines 1 and 1 and 20 and 20 is called "the creek," and the corresponding spaces between the parallel lines at right angles are called the "dry branches."

Three of the "*ahl* sticks" (fig. 7) have a red stripe running down the middle and one has a blue stripe. They are held by the player in one hand and struck downward, so that their ends come on the "*ahl* stone" with considerable force. If all the sticks fall with the sides without grooves uppermost, the play is called "white," and counts ten. If all the grooved sides come uppermost, it is called "red," and counts five. Both of these throws entitle the player to another throw. If one grooved side is uppermost, it counts one; two grooved sides, two, and three grooved sides, three. The game is played by any even number

[1] *Zohn*, "creek;" *ahl*, "wood."

[2] Nos. 16535, 16536, Mus. Arch. Univ. Penn. Collected by Lieut. H. L. Scott, U. S. A., who kindly furnished the description of the game.

of girls or women (never by men or boys), half on one side the line N S and half on the other. The flat *ahl* stone is placed in the middle of the cloth, and the players kneel on the edge. The two awls are stuck in the creek at 1 1. The player at A makes the first throw, and the throwing goes around the circle in the direction of the hands of a watch, each side counting the results of each throw on the "awl cloth" by sticking its awl just beyond the mark called for by the results of the throw. The moves are made in opposite directions, as indicated by the arrows.

If in counting any awl gets into the "creek" at N, that side must forfeit a counter to the other side and be set back to the "creek" at S. That side is then said to have fallen into the "creek," the object being to "jump over." If in their passage around the circle the two "awls" get in the same division, the last comer is said to whip or kill the former, who forfeits a counter, and is set back to the beginning. The counting continues until one gets back to the "creek" at S. The one first at S receives a counter, and if there is more than enough to take it to the "creek," the surplus is added to the next round; that is, the "creek" is jumped, and the "awl" put beyond it as many points as may be over. When one side wins all the counters, it conquers. If the game should be broken up before this event, the side which has the greater number of counters is the victor.[1]

See account of game by Mr. James Mooney on page 731.

This game was selected for exhibition from many similar games played by different tribes in America as readily illustrating the probable derivation of the four staves. Three of them will be seen to appear to be marked on one face with the feathered shaftment of an arrow, while the fourth probably represents the atlatl or "throwing stick."

In the following pages a description is given of implements for American games of the preceding type contained in various museums of the United States, together with accounts of the methods of play, arranged alphabetically under linguistic families and tribes. For the purpose of comparison all games in which objects are tossed to determine number are included. Their relations one to another, whatever they may be, will doubtless become apparent through this and subsequent collections.

[1] Lieutenant Scott further states that the Kiowa have a custom of wetting the fingers and slapping them several times on the stone before a throw, and calling out "red, red," or "white, white," according to the number they desire to count; or, if but "one" should be required to throw the opposite party into the "creek," someone puts her finger into her mouth, and, drawing it carefully across the top of the stone, calls out *parko, parko* ("one, one"). Often before the throw the thrower will rub the four sticks in a vertical position backward and forward several times between the palms of the hands, to insure good luck.

"The Comanche have a similar game which they play with eight *ahl* sticks, and the Cheyenne and Arapaho are said to have a game which they play with *ahl* sticks, which are 2 feet or more long." (H. L. S.)

ALGONQUIAN STOCK.

ARAPAHO. Cheyenne and Arapaho Reservation, Indian Territory. (Cat. Nos. 152802, 152803, U.S.N.M.)

Set of five dice of buffalo bone, marked on one side with burned

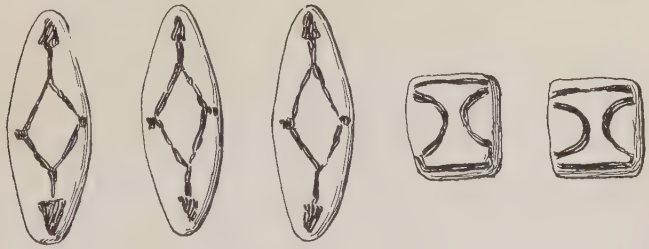


Fig. 8.

SET OF BONE DICE.

Lengths, $\frac{7}{8}$ and $1\frac{3}{4}$ inches.

Arapaho Indians, Indian Territory.

Cat. No. 152802, U.S.N.M.

designs (fig. 8), and basket of woven grass, 9 inches in diameter at top and $2\frac{1}{2}$ inches deep (fig. 9). The rim of the basket is bound with cotton cloth, and the inner side of the bottom is covered with the same

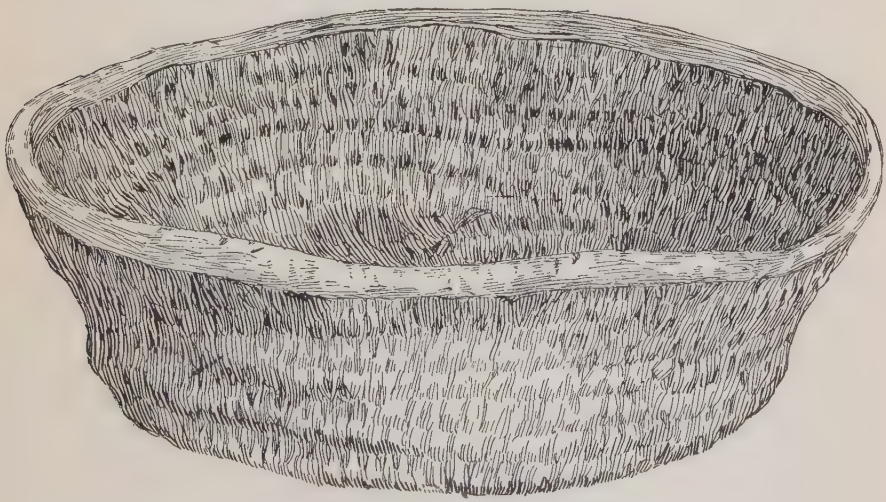


Fig. 9.

BASKET FOR DICE GAME.

Diameter, 9 inches.

Arapaho Indians, Indian Territory.

Cat. No. 152802, U.S.N.M.

material. The game is played by women. Collected by James Mooney, 1891.

The following account of the game is given by the collector:[1]

The dice game is called *ta-ú sĕtá tina* (literally, "striking" or "throwing against" something) by the Arapaho, and *Mónshimûnh* by the Cheyenne, the same name being now given to the modern card games. It was practically universal among all the tribes east and west, and, under the name of hubbub, is described by a New England writer[2] as far back as 1634 almost precisely as it exists to-day among the prairie tribes. The only difference seems to have been that in the east it was played also by the men, and to the accompaniment of a song, such as is used in the hand games of the Western tribes. The requisites are a small wicker bowl or basket (*hat ĕ chí na*), five dice made of bone or plum stones, and a pile of tally sticks, such as are used in the awl game. The bowl is 6 or 8 inches in diameter and about 2 inches deep, and is woven in basket fashion of the tough fibers of the yucca. The dice may be round, elliptical, or diamond-shaped, and are variously marked on one side with lines or figures, the turtle being a favorite design among the Arapaho. Two of the five must be alike in shape and marking. The other three are marked with another design and may also be of another shape. Any number of women and girls may play, each throwing in turn, and sometimes one set of partners playing against another. The partners toss up the dice from the basket, letting them drop again into it, and score points according to the way the dice turn up in the basket. The first throw by each player is made from the hand instead of from the basket. One hundred points usually count a game, and stakes are wagered on the result as in almost every other Indian contest of skill or chance. For the purpose of explanation we shall designate two of the five as "rounds" and the other three as "diamonds," it being understood that only the marked side counts in the game, excepting when the throw happens to turn up the three "diamonds" blank while the other two show the marked side, or, as sometimes happens, when all five dice turn up blank. In every case all of one kind at least must turn up to score a point. A successful throw entitles the player to another throw, while a failure obliges her to pass the basket to someone else. The formula is:

1 only of either kind	=0
2 rounds	=3
3 diamonds (both rounds with blank side up)	=3
3 diamonds blank (both rounds with marked side up)	=3
4 marked side up	=1
5 (all) blank sides up	=1
5 (all) marked sides up	=8

A game similar in principle, but played with six dice instead of five, is also played by the Arapaho women, as well as by those of the Comanche and probably also of other tribes.

ARAPAHO. Indian Territory. (Cat. No. 165765, U.S.N.M.)

Set of five bone dice marked on convex side with burned designs (fig. 10), and much worn basket of woven grass 10 inches in diameter at top and 2 inches deep (fig. 11). Collected by H. R. Voth.

ARAPAHO. Indian Territory. (Cat. No. 165765*a*, U.S.N.M.)

Set of five wooden dice, marked on one side with burned designs (fig. 12), representing on three a swallow or swallow hawk, and on two a dragon-fly. With preceding (Cat. No. 165765). Collected by H. R. Voth.

[1] The Ghost Dance religion, Fourteenth Annual Report of the Bureau of Ethnology, Washington, 1896, II, p. 1004.

[2] William Wood, New England Prospect, London, 1634.

Mr. Cushing suggested to the writer that these blocks were probably derived from similar gaming implements made of shards of pottery.

ARAPAHO. Darlington, Oklahoma.

Set of four dice; two oval bones, $1\frac{1}{4}$ inches in greatest diameter with

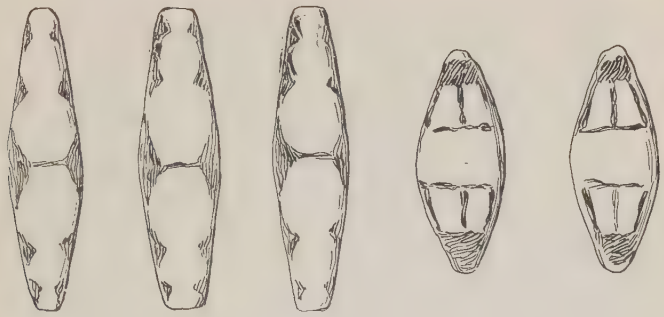


Fig. 10.

SET OF BONE DICE.

Length, $1\frac{3}{4}$ to $2\frac{1}{4}$ inches.

Arapaho Indians, Indian Territory.

Cat. No. 165765, U.S.N.M.

burned designs on one side, and two worked peach stones, also burned $\frac{15}{16}$ inch in greatest diameter (fig. 13). Opposite sides unmarked. Also shallow basket of woven grass, $9\frac{1}{2}$ inches in diameter at top and $1\frac{3}{4}$

Fig. 11.

BASKET FOR DICE GAME.

Diameter, 10 inches.

Arapaho Indians, Indian Territory.

Cat. No. 165765, U.S.N.M.

inches deep. Collected by Mr. Abram D. Nace about 1888. They are now in the private collection of Mr. Charles H. Stephens, of Philadelphia, Pennsylvania.

CHEYENNE. Cheyenne and Arapaho Reservation, Indian Territory. (Cat. No. 152803, U.S.N.M.)

Set of five bone dice marked on one side with burned designs

(fig. 14), and basket of woven grass 8½ inches in diameter at top and 2½ inches deep (fig. 15). Both sides of the bottom are covered with cotton cloth. Played by women. Collected by Mr. James Mooney, 1891.

Fig. 12.

SET OF WOODEN DICE.

Length, 1⅛ inches.

Arapaho Indians, Indian Territory.

Cat. No. 165765*a*, U.S.N.M.

Mr. George Bird Grinnell has kindly furnished the writer with the following unpublished account of the Cheyenne basket game, which he describes under the name of *Mōn shī mō ŭt.*

The Cheyenne seed, or basket game, is played with a shallow bowl and five plum stones. The bowl (Plate 4) is from 3 to 4 inches deep, 8 inches across at the top—flattened or not on the bottom—and woven of grass or strips of willow twigs. It is nearly one-half an inch thick, and is strong. All

Fig. 13.

GAMING DISKS, BONE AND WORKED PEACH STONES.

Diameters, 1¼ and $\frac{15}{16}$ inches.

Arapaho, Oklahoma.

Collection of Charles H. Stephens.

five seeds are unmarked on one side, but on the other (Plate 4) three are marked with a figure representing the paint patterns often used by girls on their faces, the cross being on the bridge of the nose, the side marks on the cheeks, and the

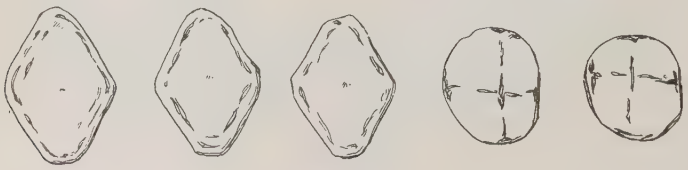


Fig. 14.

SET OF BONE DICE.

Lengths, ⅞ and 1⅛ inches.

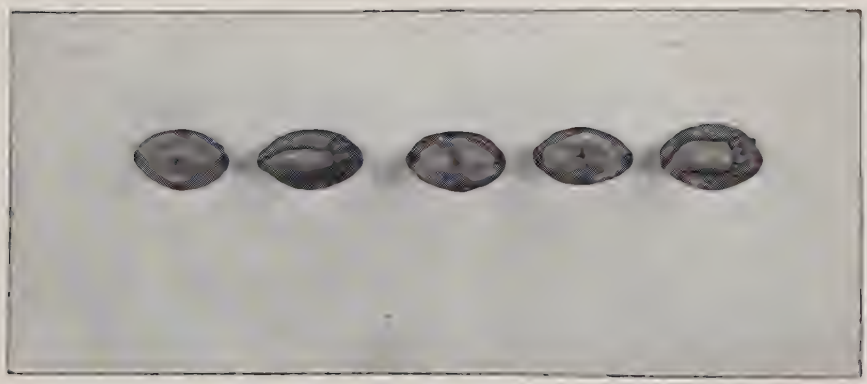
Cheyenne Indians, Indian Territory.

Cat. No. 152803, U.S.N.M.

upper and lower ones on the forehead and chin, respectively. The other two stones are marked with a figure representing the foot of a bear.[1]

These plum-stones are placed in the basket, thrown up and caught in it, and the

[1] Mr. Cushing identifies the mark of the cross with a star and the other with a bear's track, referring, respectively, to the sky and earth.



PLUM STONES AND BASKET FOR GAME.
Cheyenne Indians, Montana.
Collection of George Bird Grinnell.

combination of the sides which lie uppermost after they have fallen, determines the count of the throw.

The players sit opposite one another, and, if several are playing, in two rows facing each other. Each individual bets with the woman opposite to her. Each player is provided with eight sticks, which represent the points which she must gain or lose to win or lose the game. When a player has won all the sticks belonging to her opponent she has won the game and the stake.

There are several combinations of marks and blanks which count nothing for or against the player making the throw, except that she loses her chance to make another throw. Others entitle the thrower to receive one, three, or even all eight sticks, and each throw that counts anything entitles the player to another throw. All the players on the side of the thrower, i. e., in the same row, win or lose from those opposite to them as the thrower wins or loses. If the person making the first throw casts a blank, she passes the basket to the one sitting next her; if this one makes a throw that counts, she has another and another, until she throws a

Fig. 15.

BASKET FOR DICE GAME.

Diameter at top, 8½ inches.

Cheyenne Indians, Indian Territory.

Cat. No. 152803, U.S.N.M.

blank, when the basket passes on. When the basket reaches the end of the line, it is handed across to the woman at the end of the opposite row, and in the same way travels down the opposite line.

In making the throw the basket is raised only a little way, and the stones tossed only a few inches high. Before they fall the basket is brought smartly down to the ground, against which it strikes with some little noise. Some of the throws are given below, the sides of the seeds being designated by their marks:

2 blanks, 2 bears, and 1 cross count nothing.
4 blanks and 1 bear count nothing.
5 blanks count 1 point; thrower takes 1 stick.
3 blanks and 2 bears count 1 point; thrower takes 1 stick.
1 blank, 2 bears, and 2 crosses count 1 point; thrower takes 1 stick.
2 blanks and 3 crosses count 3 points; thrower takes 3 sticks.
2 bears and 3 crosses count 8 points; thrower takes 8 sticks, and wins the game.

The women do not sing at this game, but they chatter and joke continually as the play goes on.

Mr. Grinnell informs me that the specimen figured came from the "Northern Cheyenne Agency, officially known as the Tongue River Agency, in Montana, the Indians living on Rosebud and Tongue rivers, which are tributaries of the Yellowstone from the south. At the same time the southern Cheyennes of Indian Territory have the same game."

CHIPPEWA. Lake Superior Region.

Schoolcraft[1] describes the bowl game of the Chippewa under the name of *puggesaing*.

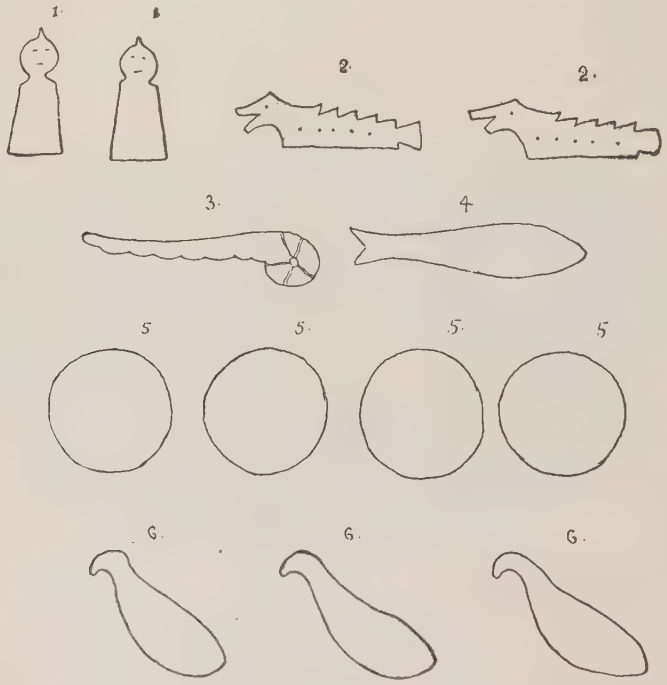


Fig. 16.

DICE FOR BOWL GAME.

Chippewa Indians.

After Schoolcraft.

It is played with thirteen pieces, nine of which are formed of bone and four of brass, all of circular shape (fig. 16). The right side of the eight pieces of bone are stained red, with edges and dots burned black with a hot iron; the reverse is white. The brass pieces have the right side convex and the reverse concave. The convex surface is bright, the concave dark or dull.

The first piece, called *ininees*, or *ogima*, represents a ruler. No. 2 typifies an amphibious monster, and is called *gitchy kinábik*, or the great serpent. No. 3 represents the war club. No. 4 is a fish (*kenozha*). No. 5 are small disks of brass, and No. 6, a duck, *sheesheeb*.

[1] Information respecting the history, conditions, and prospects of the Indian tribes of the United States, Philadelphia, 1853, II, p. 72.

The game is won by the red pieces, the arithmetical value of each of which is fixed, and the count, as in all games of chance, is advanced or retarded by the luck of the throw. Nothing is required but a wooden bowl, which is curiously carved and ornamented (the owner relying somewhat on magic influence), and having a plain, smooth surface.

The author gives the counts for sixteen different throws from one hundred and fifty-eight down to two.

Long[1] gives the following description of the bowl game among the Chippewa:

Athtergain, or miss none but catch all, is also a favorite amusement with them, in which the women frequently take part. It is played with a number of hard beans, black and white, one of which has small spots and is called king; they are put into a shallow wooden bowl and shaken alternately by each party, who sit on the ground opposite to one another; whoever is dexterous enough to make the spotted bean jump out of the bowl receives of the adverse party as many beans as there are spots; the rest of the beans do not count for anything.

The following account, given by J. G. Kohl,[2] who does not designate the particular tribe, probably refers to the Chippewa:

The game called by the Indians *pagessan*, and which I frequently saw played, the Canadians call *le jeu au plat* (the game of the bowl). It is a game of hazard, but skill plays a considerable part in it. It is played with a wooden bowl and a number of small figures bearing some resemblance to our chessmen. They are usually carved very neatly out of bones, wood, or plum stones, and represent various things—a fish, a hand, a door, a man, a canoe, a half-moon, etc. They call these figures *pagessanag* (carved plum stones), and the game has received its name from them. Each figure has a foot on which it can stand upright. They are all thrown into a wooden bowl (in Indian *onagan*), whence the French name is derived. The players make a hole in the ground and thrust the bowl with the figures into it, while giving it a slight shake. The more figures stand upright on the smooth bottom of the bowl through this shake all the better for the player. Each figure has its value, and some of them represent to a certain extent the pieces in the game of chess. There are also other figures, which may similarly be called the pawns. The latter, carved into small round stars, are all alike, have no pedestal, but are red on one side and plain on the other, and are counted as plus or minus according to the side uppermost. With the pawns it is a perfect chance which side is up, but with the pieces much depends on the skill with which the bowl is shaken. The other rules and mode of calculation are said to be very complicated, and the game is played with great attention and passion.

CREE.

In Father Lacombe's Cree dictionary[3] we find *jeu de hasard, pakessewin*.

ILLINOIS. Illinois.

It would appear from a manuscript Illinois dictionary in the library of Dr. J. Hammond Trumbull[4] that this tribe was familiar with the game of plum-stones.

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[1] J. Long, Voyages and Travels of an Indian Interpreter, London, 1791, p. 52.

[2] Kitchi-Gami, Wanderings Round Lake Superior, London, 1860, p. 82.

[3] Rév. Père Alb. Lacombe, Dictionnaire de la langue des Cris, Montreal, 1874.

[4] Andrew McFarland Davis, Indian Games, Bulletin of the Essex Institute, XVIII, p. 187.

MASSACHUSETTS. Massachusetts.

William Wood, in his "New England Prospect,"[1] relates the following:

They have two sorts of games, one called *puim*, the other *hubbub*, not much unlike cards and dice. *Hubbub* is five small bones in a small smooth tray, the bones be like a die but something flatter, black on the one side and white on the other, which they place on the ground, gainst which violently thumping the platter, the bones mount changing colors with the windy whisking of their hands to and fro, which action in that sport they much use, smiting themselves on the breast and thighs, crying out Hub Hub Hub. They may be heard playing this game a quarter of a mile off. The bones being all black or white make a double game: if three of one color and two of another, then they afford but a single game; four of a color and one differing is nothing. So long as the man wins he keeps the tray, but if he lose the next man takes it.

Fig. 17.
GAMBLING BOWL.
Menominee Indians.
After Hoffman.

MENOMINEE. Wisconsin.

Dr. Walter J. Hoffman[2] describes the Menominee form of the game under the name of *â kqa' siwŏk*.

It was frequently played in former times, but of late is rarely seen. It is played for purposes of gambling, either by two individuals or by two sets of players. A hemispheric bowl (fig. 17), made out of the large round nodules of a maple root, is cut and hollowed out. The bowl is symmetric and is very nicely finished. It measures 13 inches in diameter at the rim, and is 6 inches in depth. It measures $\frac{5}{8}$ inch in thickness at the rim, but gradually increases in thickness toward the bottom, which is about an inch thick. There are forty counters, called *ma'atik*, made of twigs or trimmed sticks of pine or other wood, each about 12 inches long and from $\frac{1}{4}$ to $\frac{1}{3}$ inch thick. Half of these are colored red, the other half black, or perhaps left their natural whitish color.

The dice or *aska'sianok* consists of eight pieces of deer horn, about $\frac{3}{4}$ inch in diameter and $\frac{1}{8}$ inch thick, but thinner toward the edges. Sometimes plum-stones or even pieces of wood are taken, one side of them being colored red, the other side remaining white or uncolored. When the players sit down to play the bowl containing the dice is placed on the ground between the opponents; bets are made; the first player begins a song in which the other players as well as the spectators join. At a certain moment the one to play first strikes the bowl a smart tap, which causes the dice to fly upward from the bottom of the bowl, and as they fall and settle the result is watched with very keen interest. The value represented by the position of the dice represents the number of counters which the player is permitted to take from the ground. The value of the throw is as follows:

First throw, 4 red dice and 4 white, a draw.
Second throw, 5 red dice and 3 white, counts 1.
Third throw, 6 red dice and 2 white, counts 4.
Fourth throw, 7 red dice and 1 white, counts 20.
Fifth throw, 8 red dice and 0 white, counts 40.

The players strike the bowl alternately until one person wins all the counters—both those on the ground and those which the opponent may have won.

[1] London, 1634.

[2] The Menominee Indians, Fourteenth Annual Report of the Bureau of American Ethnology, p. 241.

MICMAC. Nova Scotia. (Cat. No. 18850, Mus. Arch., Univ. Penn.)

Set of six buttons of vegetable ivory (fig. 18) (actual buttons), about $\frac{7}{8}$ inch in diameter, rounded and unmarked on one side and flat with a dotted cross on the other, being modern substitutes for similar objects of caribou bone. Bowl of wood (fig. 19), nearly flat, $11\frac{1}{2}$ inches in diameter. Fifty-one round counting-sticks (fig. 20), $7\frac{3}{4}$ inches in length, and four counting-sticks (fig. 21), $7\frac{1}{2}$ inches in length. Collected by the donor, Stansbury T. Hager. The following account of the game is given by the collector:[1]

Fig. 18.

SET OF BUTTONS FOR DICE IN WŎLTĔS TAKÛN.

Diameter, $\frac{7}{8}$ inch.

Micmac Indians, Nova Scotia.

Cat. No. 18850, Museum of Archæology, University of Pennsylvania.

A game much in use within the wigwams of the Micmac in former times is that called by some writers *altestakun* or *wŏltĕs takûn*. By good native authority it is said that the proper name for it is *wŏltĕstōmkwŏn*. It is a kind of dice

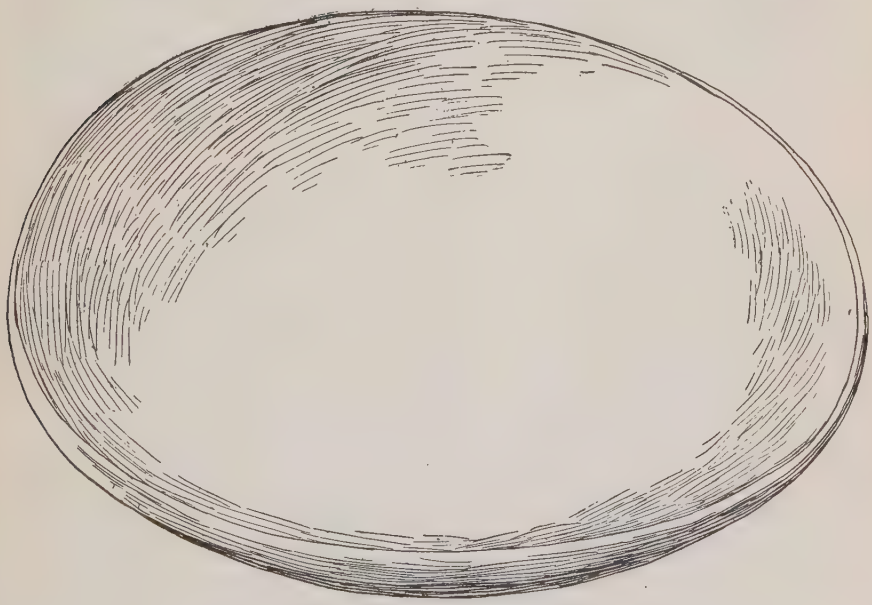

Fig. 19.

WOODEN BOWL FOR WŎLTĔS TAKÛN.

Diameter, $11\frac{1}{2}$ inches.

Micmac Indians, Nova Scotia.

Cat. No. 18850, Museum of Archæology, University of Pennsylvania.

game of unknown antiquity, undoubtedly of pre-Columbian origin. It is played upon a circular wooden dish—properly rock maple—almost exactly a foot in diameter,

[1] Micmac Customs and Traditions, The American Anthropologist, January, 1895, p. 31.

hollowed to a depth of about ¾ inch in the center. This dish plays an important rôle in the older legends of the Micmacs. Filled with water and left over night, its appearance next morning serves to reveal hidden knowledge of past, present, and future. It is also said to have been used as a vessel upon an arkïte trip. The dice of caribou bone are six in number, having flat faces and rounded sides. One face is plain; the other bears a dotted cross (fig. 18). When all the marked or all the unmarked faces are turned up there is a count of five points; if five marked faces and one unmarked face or five unmarked faces and one marked face are turned up, one point results; if a die falls off the dish there is no count. There are fifty-five counting sticks—fifty-one plain rounded ones about 7½ inches long, a king-pin[1] shaped like the forward half of an arrow, and three notched sticks, each presenting half of the rear end of an arrow. These last four are about 8 inches long. Three of the plain sticks form a count of one point, the notched sticks have a value of five points, while the king-pin varies in value, being used as fifty-second plain stick, except when it stands alone in the general pile; then it has, like the notched sticks, a value of five points. Thus the possible points of the count are seventeen (one-third of fifty-one) on the plain sticks and fifteen (five times three) on the three notched sticks, a total of thirty-two; but by a complex system the count may be extended indefinitely. In playing the game two players sit opposite each other, their legs crossed in a characteristic manner, and the dish, or *wolles*, between them usually placed on a thick piece of leather or cloth. A squaw keeps the score on the

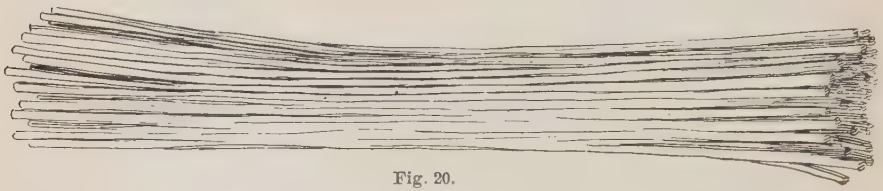

Fig. 20.
COUNTING STICKS FOR WŎLTĔS TAKÛN.
Length, 7¾ inches.
Micmac Indians, Nova Scotia.
Cat. No. 18850, Museum of Archæology, University of Pennsylvania.

counting-sticks, which at first lie together. The six dice are placed on a dish with their marked faces down; one of the players takes the dish in both hands, raises it an inch or two from the ground, and brings it down again with considerable force, thus turning the dice. If all but one of the upturned faces are marked or unmarked,

[1]Mr. Hager informs me that the king-pin is called *kesegoo*—"the old man"—and that the notched sticks are his three wives and the plain sticks his children. The Micmac explains these names by saying that when a stranger calls the children come out of the wigwam first, then the women, and then the head of the family; and this is the way it happens when one plays at *wŏltĕstŏmkwŏn*. "The technical name for the king-pin is *nandaymelgawasch* and for the wives *tkŏmoowaal*, both of which names mean, they say, 'it counts five' and 'they count five.' *Nan* is the Micmac for 'five,' but no numeral of which I know appears in the second name." Mr. Hager regards the polygamous element in the game as a good indication of its antiquity, if, he adds, "such indeed be necessary." Referring to the passes described by Mrs. W. W. Brown, in her paper on the games of the Wabanaki Indians (see p. 708), he says: "These passes are made by the Micmac in *wŏltĕstŏmkwŏn* by passing the right hand rapidly to the left over the dish, and shutting it exactly as if catching a fly." Wedding ceremonies among the Micmac were celebrated by the guests for four days thereafter. On the first day they danced the serpent dance, on the second they played football (*tooadĭjik*), on the third they played *lacrosse* (*madĭjik*), and on the fourth *wŏltĕstŏmkwŏn*.

he repeats the toss and continues to do so as long as one of these combinations results. When he fails to score, the amount of his winnings is withdrawn from the general pile and forms the nucleus of his private pile. His opponent repeats the

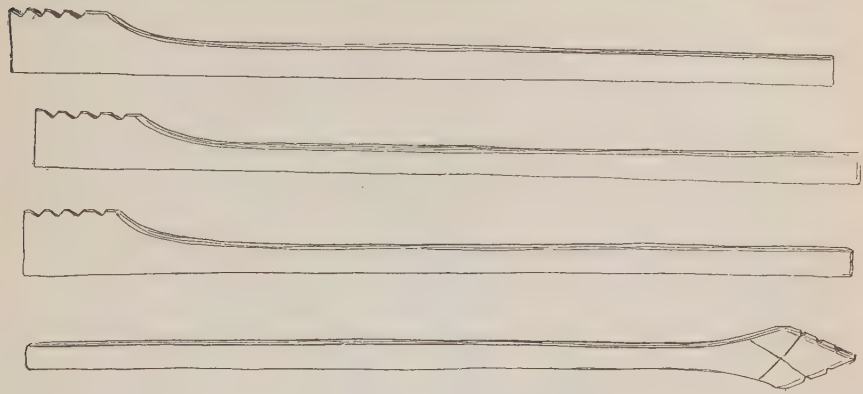

Fig. 21.
COUNTING STICKS FOR WÖLTĒS TAKŪN.
Length, 7⅛ inches.
Micmac Indians, Nova Scotia.
Cat. No. 18850, Museum of Archæology, University of Pennsylvania.

dice-throwing until he also fails to score. Two successive throws of either a single point or of five points count thrice the amount of one throw; that is, three points or fifteen points, respectively. Three successive throws count five times as much as

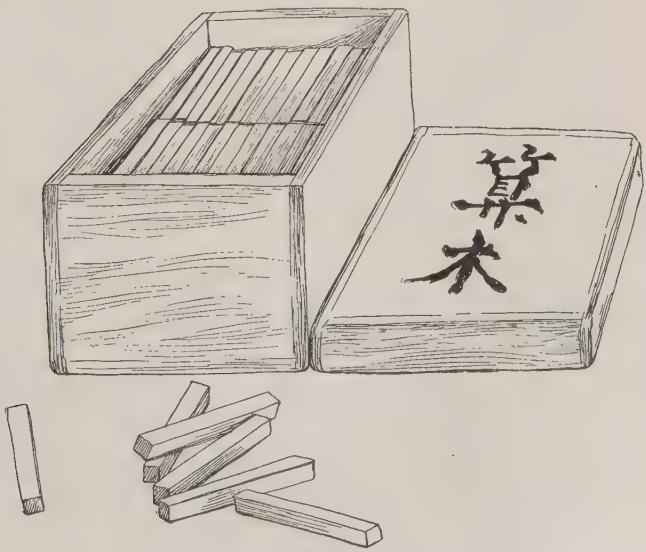

Fig. 22.
COUNTING STICKS (*sangi*).
Length, 2 inches.
Japan.
Cat. No. 18306, Museum of Archæology, University of Pennsylvania.

a single throw, etc. After the pile of counting-sticks has been exhausted, a new feature is introduced in the count. The player who scores first takes a single plain stick from his pile and places it by itself, with one of its sides facing him to repre-

sent one point, and perpendicular to this, either horizontally or vertically, to represent five points.[1]

He continues to add sticks thus as he continues to score. This use of the sticks as counters to indicate unpaid winnings is a device for deferring further settlement until the game seems near its end, and also serves to increase the count indefinitely to meet the indefinite duration of the game, as after one player secures a token his opponent, when he scores, merely reduces the former's pile by the value of his score. The reduction is effected by returning from the token pile to the private pile the amount of the opponent's score; hence at any time the token pile represents the amount of advantage which its owner has obtained since the last settlement. These settlements are made whenever either party may desire it; this, however, is supposed to be whenever a player's token pile seems to represent a value approaching the limit of his opponent's ability to pay. If his opponent should permit the settlement to be deferred until he were no longer able to pay his debts, then he would lose the game to the first player; whereas, if one player after the settlement retains five plain sticks but not more, a new feature is introduced which favors him. If, while retaining his five sticks, he can score five points before his opponent scores at all, he wins the game in spite of the much greater amount of his opponent's winnings up to that point. If his opponent scores one point only before he obtains his five points, he still has a chance, though a less promising one. If, after paying over the three plain sticks that represent a single point two plain sticks still remain to him, he is then compelled to win seven points before his opponent wins one or he forfeits the game; but if he succeeds in winning his seven points, the game is still his. However, in these last chances he is further handicapped by the rule that he can at no time score more points than are represented in his private pile. Consequently, if with only five plain sticks in his possession he could only score a single point, even if his toss should call for five; but with six plain sticks he could score two points; with nine sticks, three, etc. The last chances are: With only five plain sticks, five points are necessary to win; with three sticks, six points; with two sticks, seven points; with one stick, seven points. There are two other minor rules: One, that in counting five points on plain sticks four bundles of four each are given instead of five bundles of three each, as one should expect; total, sixteen. The other rule is that to count six points we use a notched stick plus only two plain sticks, instead of three, as might be expected.

This game may be regarded as an American analogue of the Chinese game of *Chong ün ch'au* (No. 27).

Mr. Hager states that the preceding game was invented and taught by the hero Glooscap. They also have a similar game called *Wŏbŭnārunk*, which, they say, was invented and owned by Mikchikch, the turtle, one of Glooscap's companions, to whose shell the dice bear some resemblance.[2] The name *Wŏbŭnārunk* is derived from *wŏbŭn*, meaning dawn; to which is added a termination signifying anything molded or worked upon by human hands.[3]

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[1] This system of scoring is identical with that used in Japan with the counting-sticks, or *sangi* (Chinese, *sün muk*). One is indicated by a stick arranged vertically, and five by a stick placed horizontally. A set of *sangi* in the University Museum (Cat. No. 18306) (fig. 22), consists of one hundred and twenty-seven little wooden blocks, $1\frac{5}{16}$ inches in length, and about $\frac{1}{4}$ inch square in section. *Sangi* are, or rather were employed in Japan in the higher mathematics, the use of the *soroban* or abacus not being customary with scholars.

[2] The account of *Wŏbŭnarunk* is from an unpublished manuscript by Mr. Hager, which he courteously placed in my hands.

[3] From the fact that white shell beads (wampum) are constantly referred to as being used as stakes, not only among the tribes of the Atlantic coast but in the

The outfit for the game consists simply of six dice, made from moose or caribou bone, though one Micmac at least is positive that the teeth only of these animals can properly be used. In playing, these dice are thrown from the right hand upon the ground and the points are counted according to the number of marked or unmarked faces which fall uppermost. It is customary for a player to pass his hand quickly over the dice, if possible, after he has tossed them and before they reach the ground, in order to secure good luck. The shape of the dice is that of a decidedly flattened hemisphere, the curved portion being unmarked. The base or flat surface is about the size of a 25-cent piece and presents three figures (fig. 23). Close to its edge there is a circle, touched at four points by a series of looped curves, which form a kind of cross. Within each of the four spaces thus separated is an equal-armed cross composed of nine dots, which, with the dot in the center of the die, make a total of thirty-seven dots upon each piece, or of two hundred and twenty-two dots (37 by 6) used in the game.[1]

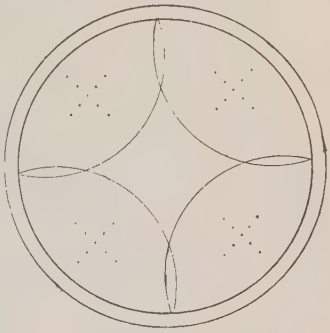

Fig. 23.
GAMING DISK FOR WŌBŬNĀRUNK.
Diameter, 1¾ inches.
Micmac Indians, Nova Scotia.
From a drawing by Stansbury Hager.

Southwest (see Cushing's account of the white shell beads used in *Sho'-li-we*), the writer is inclined to believe that the name of this same *Wŏbŭnārunk* is derived from the use of wampum (*wobun*, "white," so called from the white beads), as stakes for which it was played. Again, it may refer to the white disks; but, however this may be, a peculiar significance is attached to the use of shell beads as gambling counters or stakes. In the Chinese game of *Fán t'án* the stakes are represented by specially made white and black counters, known as white and black "pearls."

[1] "In view of the numerical suggestiveness of dots and of the presence of that peculiar repetition of numbers which characterizes all triple multiples of the key number thirty-seven, it may be worthy of note that the number of dots included in the seven counts of the game is seven hundred and seventy-seven. The Micmac language contains native words for numbers as great as a million, and, as Dr. Rand says, is capable of indefinite numerical extension, a fact which surely appears to involve some knowledge of the properties of numbers. That certain numbers have been used as symbols in ritual and myth is quite as unquestionable among the Micmacs as among so many tribes and peoples, primitive and otherwise. The importance of such dice games in developing and extending the knowledge of numbers is self-evident. As to the figures upon the dice, the use of the cross from prehistoric times as a native symbol throughout the length and breadth of the Americas is too well known to justify further comment. The Micmacs painted it upon their canoes and wigwams and attributed to it marvelous efficacy as a healing power. To play either *Wŏltĕstŏmkwŏn* or *Wŏbŭnārunk* with dice from which the cross is omitted would be certain, they believed, to bring dire misfortune upon all participants. Several Micmacs have related to me, almost word for word, the same legend of the origin of the cross among them that was reported by Pere Leclercq at Gaspé more than two centuries ago; and it is noticeable that this legend contains no Christian element. They also associated this symbol with the four quarters into which they divided the land for the purpose of collecting medicinal roots and herbs, while a circle represents to them either that of their wigwam or of the horizon. The flat surface of the die, therefore, with its four crosses and surrounding circle, may symbolize the world-

The count is as follows:

If 6 marked faces fall face up, 50 points.
If 5 marked faces fall face up, 5 points.
If 4 marked faces fall face up, 4 points.
If 3 marked faces fall face up, 3 points.
If 2 marked faces fall face up, 2 points.
If 1 marked face falls face up, 1 point.
If 6 unmarked faces fall face up, 5 points.
Total, 7 counts and 70 points.

The marks on the Micmac dice are similar to those on some of the inscribed shell beads known as *runtees*, found in the State of New York. One of these (fig. 24), (reproduced from Prof. W. H. Holmes's Art in Shell of the Ancient Americans),[1] is from an ancient village site at Pompey, which Rev. W. M. Beauchamp, of Baldwinsville, New York, attributes to the seventeenth century. Mr. Beauchamp writes me that both sides are alike, and that it is pierced with two holes from edge to edge.

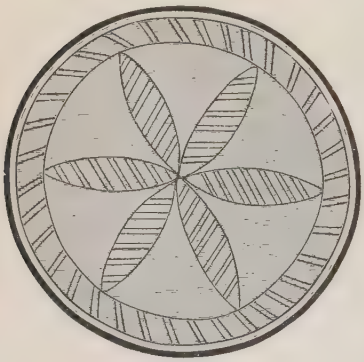

Fig. 24.
ENGRAVED SHELL BEAD (*runtee*).
Pompey, New York.

MICMAC. New Brunswick, Canada. (Cat. No. 20125, Mus. Arch., Univ. Penn.)

Set of six disks of caribou bone marked on the flat side (fig. 25); a platter of curly maple cut across the grain, 11½ inches in diameter, and fifty-two wooden counting sticks about 8 inches in length (fig. 26), four being much broader than the others and of different shapes, as shown in the figure. Collected and deposited by Mr. George E. Starr, who purchased the game from a woman named Susan Perley, a member of a tribe calling themselves the Tobique, at an Indian village half a mile north of Andover, New Brunswick. Three of the disks and the counting sticks were made for the collector, while the platter and three of the disks shown in the upper row (fig. 25) are old. Two of the latter are made apparently of old bone

wide concept of the four earth regions encircled by the horizon line and beneath the curve of the sky represented by the curved surface. The looped figure may extend the fourfold division to the sky, or it may be merely a combination of the two other symbols. At least, that each design had some particular meaning can hardly be questioned, for the Micmac still objects to playing the game if one be incorrectly drawn. A comparison of the two Micmac dice games shows the same number of dice in each and the cross and circle appear on both sets, although in slightly differing size and design. The dice of one game are, however, never used in the other. Their counts differ radically, save that the ubiquitous number seven is prominent in both, and finally *Wŏbănărunk* lacks altogether the bow-and arrow elements and their mystic attributes. Still, the resemblance is sufficiently close to suggest a possible unity of origin." (S. H.)

[1] Report of the Bureau of Ethnology, 1881, plate XXXIV, fig. 4.

buttons, there being a hole on the reverse in which the shank fitted. The designs on the faces are not the same. The woman informed Mr. Starr that the game was called *Āltes tāgen*, and that it was played by two persons, one of whom places the counting sticks in a pile together. Then the stones are placed at random in the plate, which is held in both hands and struck sharply on the ground so as to make the stones fly in the air and turn before landing in the plate again. A player continues as long as he scores, taking counters from the pile of sticks according to his throw. When the pile is exhausted, each having obtained part, the game is continued until one wins them all. Three plain sticks count one point. The three carved sticks each count four points,

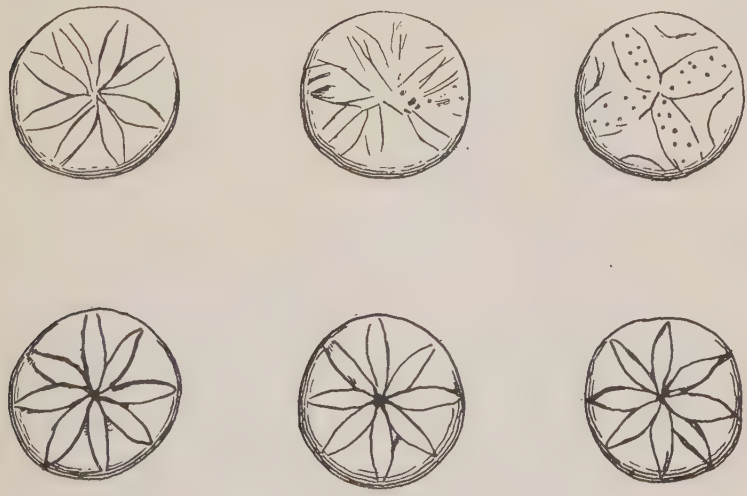

Fig. 25.

BONE GAMING DISKS.

Diameter, 1 inch.

Tobique (Micmac) Indians, New Brunswick.

Cat. No. 20125, Museum Archæology, University of Pennsylvania.

or twelve plain sticks. The snake-like stick is kept to the last, and equals three plain sticks, and a throw that counts three is necessary to take it.

MICMAC. New Brunswick. (Cat. No. 50804, Peabody Museum.)

Set of six dice made of antler, $\frac{3}{4}$ to $\frac{7}{8}$ inch in diameter, marked on flat side with six-rayed star; bowl of birch wood, $11\frac{1}{4}$ inches in diameter, and fifty-four counting sticks (fig. 27), consisting of fifty plain sticks and four larger sticks. The latter comprise one stick with three serrations on side near one end, two each with four serrations, and one resembling the feathered shaftment of an arrow with three serrations on either side. Collected by Mr. G. M. West.

MICMAC. Hampton, New Brunswick. (Cat. No. 50792, Peabody Museum.)

Five dice of antler, $\frac{3}{4}$ to $\frac{7}{8}$ inch in diameter, marked on flat side with four-rayed star; bowl of birch wood, $9\frac{1}{8}$ inches in diameter, and fifty-two

counting sticks consisting of forty-eight plain sticks and four larger sticks. The latter comprise one stick with five serrations on one side near one end, two, each with four serrations, and one resembling feathered arrow shaftment with serrations on each side. The counting sticks in this and the preceding game are in part of bamboo.

It will be subsequently shown that the greater part of the objects used as dice, canes, blocks, bones and beaver teeth, in the games of this series can be directly traced to cane arrows and the *atlatl* or throwing stick. While such a connection can not be established for the engraved

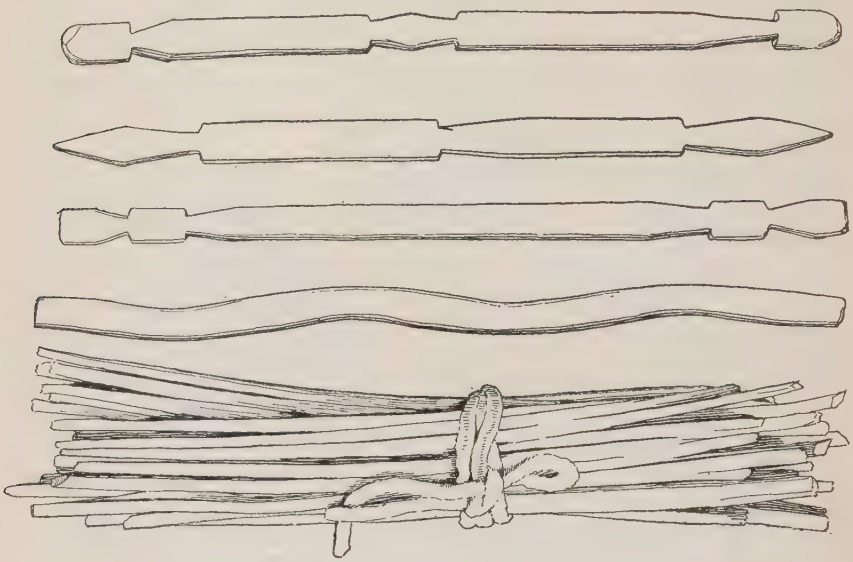

Fig. 26.

COUNTING STICKS FOR ALTES TAGEN.

Length, about 8 inches.

Micmac Indians, New Brunswick.

Cat. No. 20125, Museum Archæology, University of Pennsylvania.

bone disks of the Micmac, the three arrows and *atlatl* appear in the counting sticks (fig. 21). In some sets (as fig. 31) the *atlatl* appears replaced by a bow or serpent-like object.

NARRAGANSETT. Rhode Island.

Roger Williams, in his "Key into the Language of America,"[1] describes the games of the Narragansett as of two sorts—private and public. "They have a kinde of dice which are Plumb stones painted, which they cast in a Tray with a mighty noyse and sweating." He gives the following words referring to this game: *Wunnaugonhómmin*, "to

[1] London, 1643; Collections of the Rhode Island Historical Society, I, Providence, 1827; also, Collections of the Massachusetts Historical Society, for the year 1794, III, p. 324. Cited by Andrew McFarland Davis, Indian Games, Bulletin of the Essex Institute, XVIII, p. 173, to whom I am indebted for the reference.

play at dice in their Tray;" *Asaúanash*, "the painted plumb stones with which they throw;" and *Puttuckquapuonck*, "A playing Arbour." He describes the latter as made of long poles set in the earth, four square, 16 or 20 feet high, on which they hang great store of their stringed money, having great staking, town against town, and two chosen out of the rest by course to play the game at this kind of dice in the midst of all their abettors, with great shouting and solemnity. He also says:

> The chief gamesters among them much desire to make their gods side with them in their games; therefore I have seen them keep as a precious stone a piece of thunderbolt, which is like unto a crystal, which they dig out of the ground under some tree thunder smitten, and from this stone they have an opinion of success.

NIPISSING. Forty miles above Montreal, Canada.

Mr. J. A. Cuoq[1] describes the plum stone game among this tribe under the name of *Pakesanak*, which he says is the usual name given to five plum-stones, each marked with several dots on one side only. Four or five women squatting around a blanket make the stones jump about the height of their forehead, and according to their falling on one or the other side the fate of the player is decided. Of late the game has been improved by using a platter instead of a cover (blanket), which caused the name of the "game of platter" to be given it by the whites.

The name *pakesanak* is the plural of *pakesan*, defined as *noyau, jeu*. Dr. A. S. Gatschet has kindly given me the following analysis of this word: *pake* = to fall, to let fall, *s* = diminutive, *an* = suffix of inanimate nouns.

NORRIDGEWOCK. Norridgewock, Maine.

In the Dictionary of Father Sebastian Rasles,[2] a number of words[3] referring to games are defined,[4] from which it appears that the Norridgewock Indians played a game with a bowl and eight disks (*ronds*), counting with *grains*. The disks were black on one side and white on the other. If black and white turned up four and four, or five and

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[1] Lexique de la Langue Algonquine, Montreal, 1886.

[2] Memoirs American Academy of Science and Arts, new series, I, Cambridge, 1833.

[3] Je joue avec des ronds blancs d'un côté et noirs de l'autre, *nederakké*, v. *nedaïmké*, v. *neda8é' aïnar*.

Les ronds, *éssé' ŏánar;* les grains, *tag8ssak*.

Les grains du jeu du plat, dicuntur étiam, *ésséŏanar*.

Lors qu'ils s'en trouve du nombre de 8, 5 blancs et 3 noirs, v. 5 noirs et 3 blancs, *nebarham, keb*, etc. (on ne tire rien); idem fit de 4 blancs et 4 noirs.

Lors qu'il y en a 6 d'une couleur, et 2 de l'autre, *nemes8dam*, (on tire 4 grains).

Lors qu'il y en a 7 d'une même couleur, el qu'un de l'autre, *nedénéŏi* (on en tire 10).

Lors qu'ils sont tous 8 de même couleur, *n8rihara* (on en tire 20).

Nesákasi, je plante un bois dans terre p'r marquer les parties.

Je lui gagne une partie, je mets un bois p'r, etc., *neg8dagŏharaï*.

Nedasahamaïkŏ, il me démarque une partie, il ôte un bois, etc.

Je joue au plat, *n8aïradéháma* 3. *8aï mé*.

Mets les petits ronds, etc., *p8né ésséŏanar*.

Nederakébena, je les mets.

[4] Indian Games, Bulletin of the Essex Institute, XVIII, p. 187.

three, there was no count; six and two counted four; seven and one, ten; and all eight of the same color, twenty. Davis remarks that "according to Rasles, the count was sometimes kept by thrusting

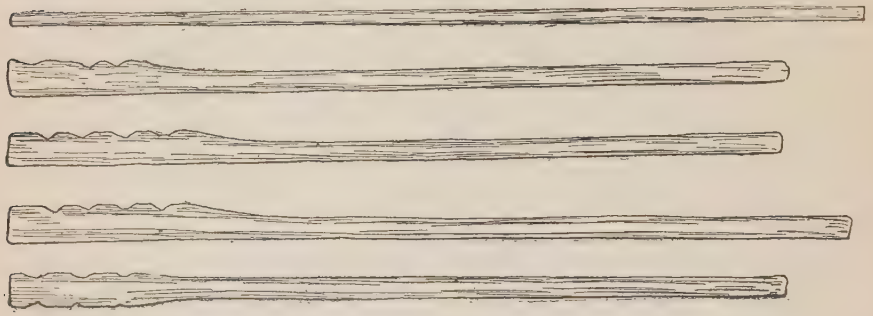


Fig. 27.
COUNTING STICKS.
Length, 8 to 8¾ inches.
Micmac Indians, New Brunswick.
Cat. No. 50804, Peabody Museum of American Archæology.

sticks into the ground. This is shown by Indian words used in the games which Rasles interprets respectively: 'I thrust a stick in the ground to mark the games;' 'I win a game from him; I place a stick,' etc.; 'He takes the mark for a game away from me; he removes a stick,' etc.; 'He takes away all my marks; he removes them all," etc.

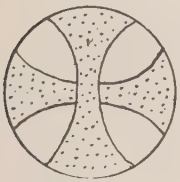


Fig. 28.
BONE DIE USED IN BOWL GAME (*all tes-teg-enŭk*).
Passamaquoddy Indians, Maine.
After drawing by Mrs. W.W. Brown.

OJIBWA.

Tanner[1] describes the game as follows, under the name of *Bug-ga-sank* or *Beg-ga-sah:*

The *beg-ga-sah-nuk* are small pieces of wood, bone, or sometimes of brass, made by cutting up an old kettle. One side they stain or color black, the other they aim to have bright. These may vary in number, but can never be fewer than nine. They are put together in a large wooden bowl or tray kept for the purpose. The two parties, sometimes twenty or thirty, sit down opposite to each other or in a circle. The play consists in striking the edge of the bowl in such a manner as to throw all the *beg-ga-sah-nuk* into the air, and on the manner in which they fall into the tray depends his gain or loss. If his stroke has been to a certain extent fortunate, the player strikes again and again, as in the game of billiards, until he misses, when it passes to the next.

The Rev. Peter Jones[2] says:

In these bowl plays they use plum-stones. One side is burnt black and the other is left its natural color. Seven of these plums are placed in a wooden bowl and are then tossed up and caught. If they happen to turn up all white, or all black, they count so many. This is altogether a chance game.

[1] A Narrative of the Captivity and Adventures of John Tanner, New York, 1830, p. 114.

[2] History of the Ojibwa Indians, London, 1861, p. 135.

PASSAMAQUODDY. Maine.

The bowl game among these Indians is described by Mrs. W. W. Brown,[1] of Calais, Maine, under the name of *All-tes teg-enŭk*.

Fig. 29.

MANNER OF HOLDING DISH IN ALL-TES-TEG-ENŬK.

Passamaquoddy Indians, Maine.

After Mrs. W. W. Brown.

It is played by two persons kneeling, a folded blanket between them serving as a cushion on which to strike the shallow wooden dish, named *wal-tah-hā-mo'g'n*. This dish contains six thin bone disks (fig. 28), about ¾ inch in diameter, carved and colored on one side and plain on the other. These are tossed or turned over by holding

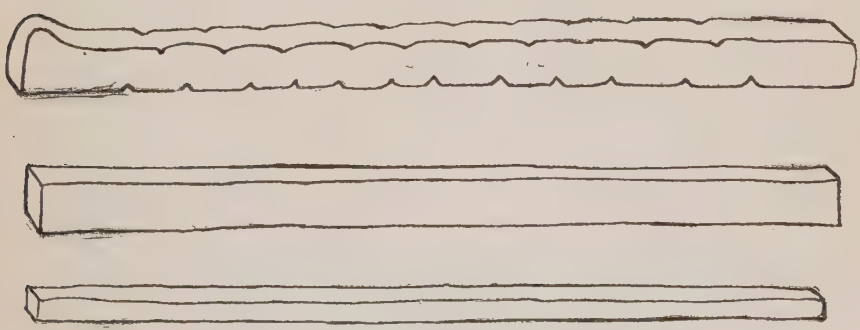


Fig. 30.

COUNTING STICKS.

Length, 6½ to 6⅞ inches.

Passamaquoddy Indians, Maine.

From sketch by Mrs. W. W. Brown.

the dish firmly in the hands and striking down hard on the cushion (fig. 29). For counting in this game there are forty-eight small sticks, almost 5 inches in length, named *ha-gă-ta-mā-g'n'al;* four somewhat larger, named *t'k'm-way-wāl*, and one notched, called *non-ā-da-ma-wuch* (fig. 30).

[1]Some Indoor and Outdoor Games of the Wabanaki Indians, Trans. Roy. Soc. Canada, Sec. II, 1888, p. 41.

All the sticks are placed in a pile. The disks are put in the dish without order; each contestant can play while he wins, but, on his missing, the other takes the dish. Turning all the disks but one, the player takes three small sticks; twice in succession, nine sticks; three times in succession, one big stick or twelve small ones. Turning all alike once, he takes a big stick; twice in succession three big ones, or two, and lays a small one out to show what is done; three times in succession he stands a big stick up—equal to sixteen small ones from the opponent—the notched one to be the last taken of the small ones, it being equal to three.

When all the small sticks are drawn and there are large ones left in the pile, instead of taking three from the opponent the players lay one out to show that the other owes three sticks, and so on until the large ones are won. Then, unless the game is a draw, the second and more interesting stage begins, and the sticks have different value. Turning all the disks but one, the player lays out one, equal to four from an opponent. Turning all the disks but one, twice in succession, he lays three out, equal to twelve from the other—three times in succession—stands one up, equal to one large or sixteen small ones. Turning all alike, he sets up one large one, twice in succession; then three large ones or, lacking these, three small ones for each large one. This would end the game if the opponent had none standing, as there would be no sticks to pay the points. But a run of three times of one kind in succession is unusual. When one has not enough sticks to pay points won by the other, comes the real test of skill, although the former has still several superior chances to win the game. If he has five sticks, he has three chances; if seven or nine sticks, he has five chances—that is, he places the disks in position, all one side up, for each of the tosses; the other contestant takes his turn at playing, but can not place the disks. Then giving the dish a peculiar slide, which they call *la luk*, or "running down hill like water," and at the same time striking it down on the cushion, he may, unless the luck is sadly against him, win twice out of three times trying.

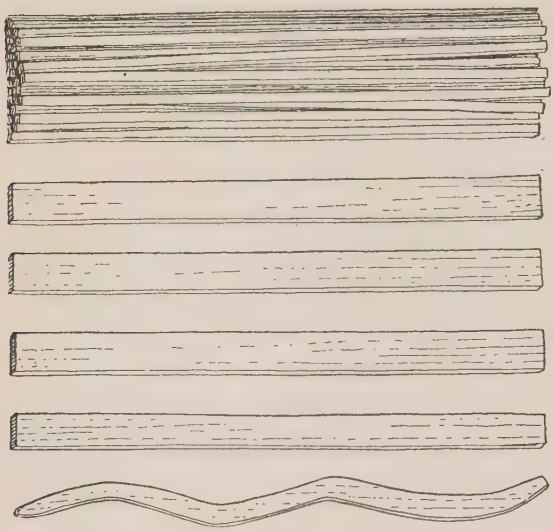


Fig. 31.

SET OF COUNTING STICKS FOR WER-LAR-DA-HAR MUN GUN.

Penobscot Indians, Maine.

Cat. No. 16551, Museum of Archæology, University of Pennsylvania.

To this day it is played with great animation, with incantations for good luck and exorcising of evil spirits, by waving of hands and crying *yon-tel-eg-wa-wŭch*. At a run of ill luck there are peculiar passes made over the dish and a muttering of *Mic-mac-squs ŭk n'me hā-ook* ("I know there is a Micmac squaw around").

One of their legends tells of a game played by Youth against Old Age. The old man had much *m'ta-ou-lin* (magic power). He had regained his youth several times by inhaling the breath of youthful opponents. He had again grown old and sought another victim. When he found one whom he thought suited to his purpose, he invited him to a game of *All-tes-teg-enŭk*. The young man was also a *m'ta-ou-lin*, and for a *po-he-gan* had *K'che-bal-lock* (spirit of the air) and, consequently, knew the old man's intention, yet he consented to a game. The old man's *wāl-tah-hā-mo'g'n*

was a skull, and the *ăll-tes-teg-enŭk* were the eyes of former victims. The game was a long and exciting one, but at each toss off by the young man the disks were carried a little higher by his *pō-he-gan* until they disappeared altogether. This broke up a game that has never been completed. The legend says that the old man still waits and the young man still outwits him.

Another Passamaquoddy game is described by Mrs. Brown under the name of *Wy-pen-og-enŭk.*

This game, like *All-tes-teg-enŭk,* has long been a gambling game. The disks are very similar, but larger, and eight in number. The players stand opposite each other with a blanket spread on the ground between them. The disks are held in the palm of the hand, and "chucked" on the blanket. This game is counted with sticks, the contestants determining the number of points necessary to win before commencing to play.

PENOBSCOT. "Oldtown Indians," Maine. (Cat. No. 16551, Mus. Arch., Univ. Penn.)

Set of counting-sticks of unpainted white wood (fig. 31), copied at the Chicago Exposition by a Penobscot Indian from those in a set of gaming implements consisting of dice, counters and bowl, there ex-

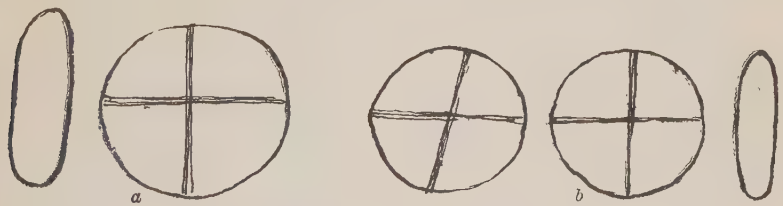


Fig. 32.
LIMESTONE DISKS, POSSIBLY USED IN GAME.
a, 1 inch in diameter; *b*, ⅞ inch in diameter.
Nottawasaga, Ontario, Canada.
Archæological Museum, Toronto, Canada.

hibited by the late Chief Joseph Nicolar of Oldtown. The latter furnished the writer with the following account of the game under the name of *Wer-lar-da-har mun gun.*

The buttons used as dice in this game are made from the shoulder blade of a moose; the counters of cedar wood. The latter are fifty-five in number, fifty-one being rounded splints about 6 inches in length, three flat splints of the same length, and one made in a zigzag shape. A soft bed is made in the ground, or on the floor, for the dish to strike on. Two persons having been selected to play the game, they seat themselves opposite to each other. The buttons are placed in the dish and it is tossed up and brought down hard upon its soft bed. If five of the six buttons have the same side up, the player takes three round splints, but if the entire six turn the same side up, it is called a double, and the player takes one of the flat ones. The game is continued until all the counters are drawn.

It might naturally be inferred that remains of the bone disks used in the bowl game would be found in our archæological museums, but as yet I have not met with any. On the other hand small disks of pottery and of stone frequently marked on one face are not uncommon, and are usually classified as gaming implements. I am indebted to Mr. David Boyle, curator of the Archæological Museum, Toronto, for the sketch, fig. 32 *a* representing a small disk of soft white limestone

from his collection, engraved with a cross on one side, fig. 32 *b* representing a similar disk with a cross on both sides.

SIKSIKA (Blackfeet). Canada.

Rev. Edward F. Wilson[1] says:

Their chief amusements are horse racing and gambling. For the latter of these they employ dice of their own construction—little cubes of wood, with signs instead of numbers marked upon them. These they shake together in a wooden dish.

Mr. J. W. Tims[2] gives *katsásinni* as a general term for gambling.

Mr. George Bird Grinnell has furnished me with the following unpublished account of the stave game among the Blackfeet, which he describes under the name of *O nes teh*, "The stick or travois[3] game."

This is a woman's gambling game, in vogue among the tribes of the Blackfoot nation, who know nothing of the basket or seed game so generally played by the more southern plains tribes.

Four straight bones—made from buffalo ribs—6 or 8 inches long, ¼ inch thick, and about ¾ inch wide, and tapering gradually to a blunt point at either end, are used in playing it (Plate 5). Three of these bones are unmarked on one side, and the fourth on this side has three or five transverse grooves running about it at its middle, or sometimes no grooves are cut and the bone is marked by having a buckskin string tied around it. On their other sides the bones are marked, two of them by zigzag lines, running from one end to the other; another, called the chief, has thirteen equally distant holes drilled in, but not through it, from one end to the other. The fourth, called "four," from its four depressions or holes, has four transverse grooves close to each end, and within these is divided into four equal spaces by three sets of transverse grooves of three each. In the middle of each of these spaces a circular depression or hole is cut. All the lines, grooves, and marks are painted in red, blue, or black.

These bones are played with, either by two women who gamble against each other or by a number of women who sit opposite and facing each other in two long lines, each player contesting with her opposite neighbor. Twelve sticks, or counters, are used in the game, and at first these are placed on the ground between the two players.

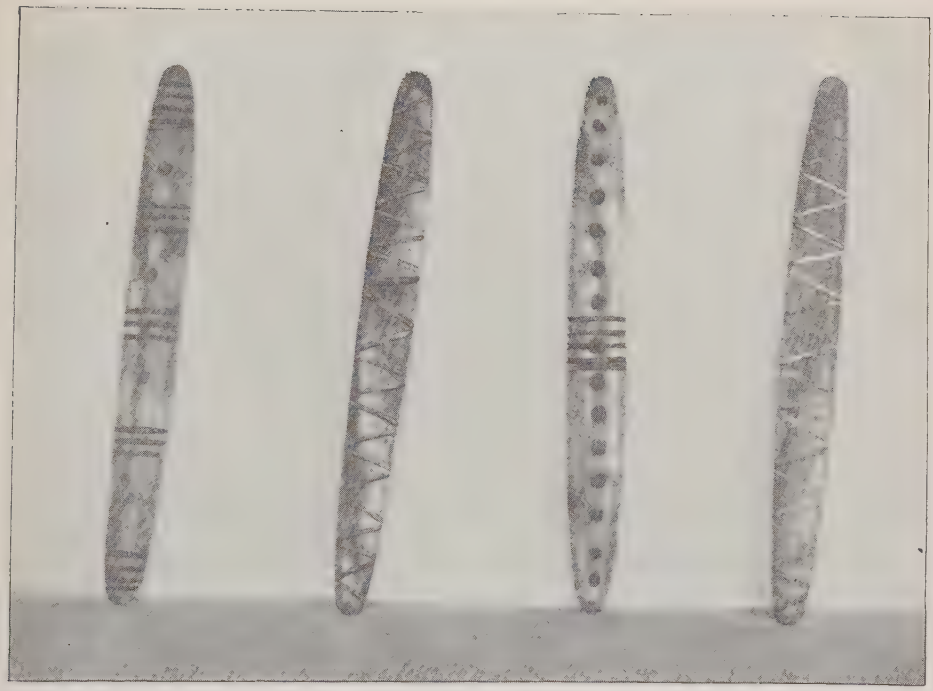
The player, kneeling or squatting on the ground, grasps the four bones in the right or left hand, holding them vertically with the ends resting on the ground. With a slight sliding motion she scatters the bones on the ground close in front of her, and the sides which fall uppermost express the count or the failure to count. Sometimes, but not always, the players throw the bones to determine which shall have the first throw in the game.

The person making a successful throw takes from the heap of sticks the number called for by the points of the throw—one stick for each point. So long as the throw is one which counts the player continues to throw, but if she fails to count the bones are passed over to the opposite player, and she then throws until she has cast a blank. When the sticks have all been taken from the pile on the ground between them the successful thrower begins to take from her opponent so many of the sticks which she has gained as are called for by her throw. As twelve points

[1] Report on the Blackfoot tribes, Report of the fifty-seventh meeting of British Association for the Advancement of Science, Manchester, 1887, London, 1888, p. 192.

[2] Grammar and Dictionary of the Blackfoot Language, London, 1889.

[3] The word *travois* (trapper, French) has been variously explained as coming from *travail* and from *traineau*. I believe, however, as stated in The Story of the Indian, p. 156, it is a corruption from *travers* or *à travers*, meaning across, and referring to the crossing of the poles over the horse's or over the dog's withers (G. B. G.).



STAVES FOR TRAVOIS GAME.
Blackfeet Indians, Blackfeet Agency, Montana.
Collection of George Bird Grinnell.

must be made by a player before the twelve sticks can come into her possession and the game be won, it will be seen that the contest may be long drawn out. A run of luck is needed to finish it.

Some of the counts made by the throws are here given:

3 blanks and chief	= 6 points =	6 sticks.
3 blanks and chief reversed	= 3 points =	3 sticks.
2 zigzag, 1, 4, and chief	= 4 points =	4 sticks.
2 blanks, 1, 4, and chief	= 2 points =	2 sticks.
2 blanks, 1 zigzag, and chief	= zero point =	zero sticks.
2 blanks, 1 zigzag, and chief reverses	= zero point =	zero sticks.
1 zigzag, 1 blank, 1, 4, and chief	= zero point =	zero sticks.

The women do not sing at this game as the men do at the gambling game of "hands."

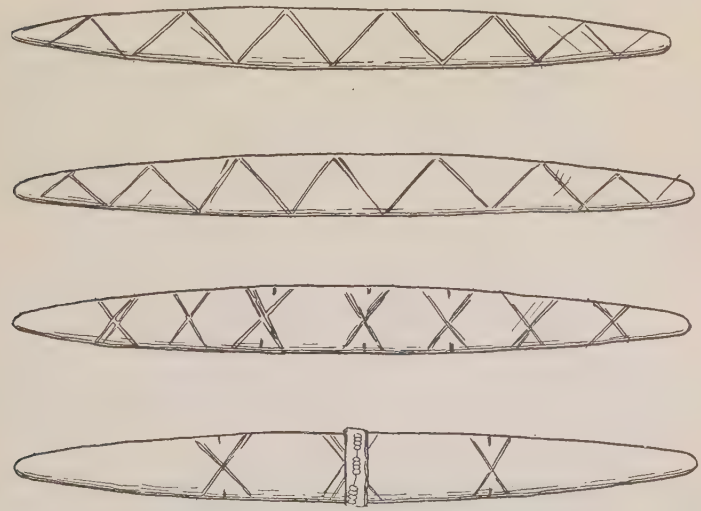


Fig. 33.

SET OF BONE GAMING STAVES.

Length, 5¼ inches.

Blackfeet, South Piegan Reserve, Montana.

Cat. No. 51693, Field Columbian Museum.

The game described was obtained by Mr. Grinnell from the Piegans of the Blackfeet Agency in northwestern Montana, on the eastern flanks of the Rocky Mountains. They live on Milk River, Cut Bank, Willow, Two Medicine Lodge, and Badger creeks; the southernmost tribe of the Blackfeet. It will be observed that the implements for this game are practically identical with those collected by Dr. Matthews from the Gros Ventres in Dakota (fig. 89). Concerning this Mr. Grinnell remarks:

The Gros Ventres of Dakota—by which are meant, of course, the Gros Ventres of the village, a tribe of Crow stock—are not very distant neighbors of the Blackfeet, and in fact the people of the old Fort Berthold village, the Gros Ventres, Rees, and Mandans, have many customs, and even some traditions, which closely resemble those of the Blackfeet.

BLACKFEET. South Piegan Reserve, Montana. (Cat. No. 51693, Field Columbian Museum, Chicago.)

Set of four bone staves, made of rib bones, 5¼ inches in length and ½ inch wide in the middle, tapering to the ends. The outer rounded sides are cut with lines, which are filled with red paint, as shown in fig. 33. Two are alike, and one of the others is banded with a narrow thong of buckskin on which are sewn twelve small blue glass beads. The reverses, which show the texture of the bone, are alike, and painted red.

Accompanied by twelve counting sticks (fig. 34) made of twigs, 5½ inches in length, smeared with red paint.

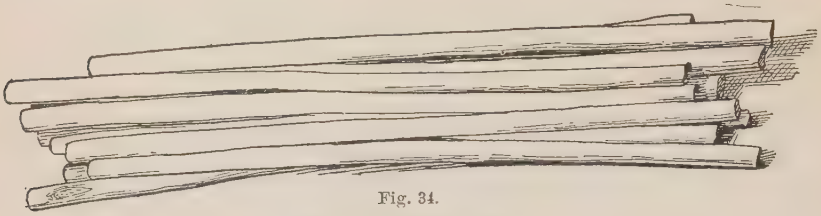


Fig. 34.

SET OF COUNTING STICKS.

Length, 5½ inches.

Blackfeet, South Piegan Reserve, Montana.

Cat. No. 51693, Field Columbian Museum.

BLACKFEET. Blood Reserve, Alberta, Canada. (Cat. No. 51654, Field Columbian Museum, Chicago.)

Three bone staves, 6⅜ inches in length and ⅝ inch in width in the middle, tapering to the ends. The outer rounded sides are carved as shown in fig. 35, two alike, in which the incised lines are filled with red paint, and one with holes, 10—3 3—9, which are painted blue. The inner sides, which show the texture of the bone, are perfectly plain.

Both of the above sets were collected by Dr. George A. Dorsey, of the Field Columbian Museum, who courteously gives me the following particulars:

I am informed that the Bloods generally use three instead of four bones. They call the game *Nitsitaiep-skitpscpian* = we play. The stick marked with holes is called "man" and the other two "snakes." Of the counts I have only this much:

All marked faces up	= 4.
All unmarked faces up	= 4.
2 unmarked and "snake" up	= 6.
1 unmarked and 2 snakes up	= 6.
1 unmarked, snake and man up	= 0.

ATHAPASCAN STOCK.

WHITE MOUNTAIN APACHE. Arizona. (Cat. No. 152696, U.S.N.M.)

Set of three sticks of hazel wood, 8 inches in length, $\frac{3}{4}$ inch wide, and about $\frac{3}{8}$ in thickness. Flat on one side, with diagonal black band

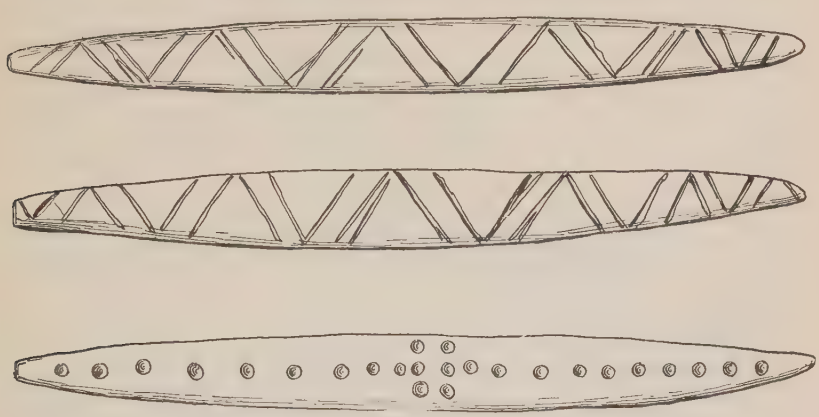


Fig. 35.

SET OF BONE GAMING STAVES.

Length, $6\frac{3}{8}$ inches.

Blackfeet, Blood Reserve, Alberta, Canada.

Cat. No. 51654, Field Columbian Museum.

across middle; other rounded and unpainted. Show marks of use. Collected by Mr. Edward Palmer.[1] Described as played by women

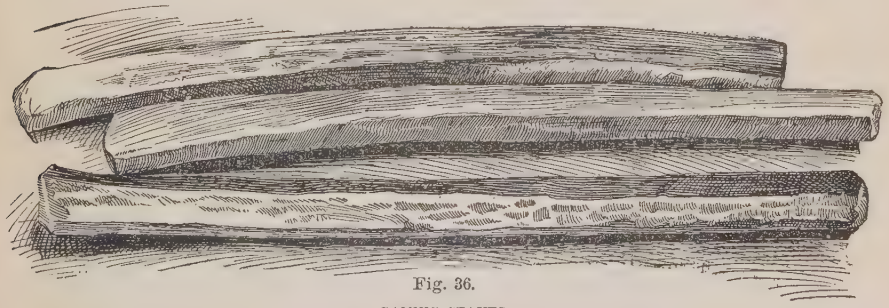


Fig. 36.

GAMING STAVES.

Length, $9\frac{1}{2}$ inches.

White Mountain Apache, Fort Apache, Arizona.

Cat. No. 18619, Museum of Archæology, University of Pennsylvania.

upon a circle[2] of forty stones divided in four tens with a division to each ten (fig. 37), and having a large flat rock placed in the middle. Four

[1] A set of sticks (fig. 36) made of a variety of the prickly ash, $9\frac{1}{2}$ inches in length, but otherwise identical with the above, are contained in the Museum of Archæology of the University of Pennsylvania (Cat. No. 18619), collected by Capt. C. N. B. Macauley, U. S. A.

[2] Mr. Palmer says a square; Captain Macauley a circle.

or six can play. Two sides are formed of equal numbers, and two sets of sticks are used. The players kneel behind the rock square. The first player takes the sticks in one hand, rounded sides out (fig. 38), and slams them end first, on the rock. From this is derived the name of the game *Sé-tich-ch*, "Hit" or "bounce-on-the-rock."[1]

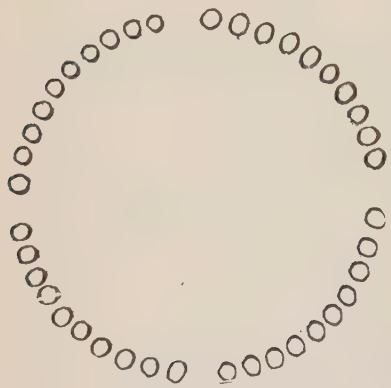


Fig. 37.
CIRCUIT FOR STAVE GAME.
Navajo and Apache.

The counts are as follows:

3 round sides up	= 10
3 flat sides up	= 5
2 round sides up and one flat	= 3
1 round side up and two flat	= 2

A throw of ten gives another throw. Each side has two sticks which are used to mark the count. The two sides count from opposite directions.

NAVAJO. New Mexico. (Cat. No. 9557, U.S.N.M.)

Set of three sticks of root of cotton wood, 8 inches in length, about $1\frac{3}{4}$ in breadth and $\frac{1}{2}$ in thickness, one side flat and blackened; the other rounded and unpainted (fig. 39). One stick tied near end to prevent splitting. They show marks of continued use. Collected by Mr. Edward Palmer.

As observed by the writer at the Columbian Exposition in Chicago, the Navajo play upon a circle of forty stones, throwing the staves ends down upon a flat stone placed in the center. Each player has a splint or twig to represent him upon the board, and these are all placed together at one of the four openings in the circle at the commencement of the game. The throws count as follows:

3 round sides up	= 10
3 flat	= 5
2 rounds and one flat	=
1 round and two flat	=

The following vocabulary of the game was furnished me by the Navajo at Chicago:

Game, *set tilth.*
Staves, *set tilth.*
Circle of stones, *sen asti.*
Stone in center, *a cle sane.*

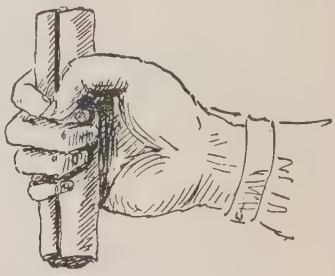


Fig. 38.
METHOD OF HOLDING STICKS BY WHITE MOUNTAIN APACHE.
From a drawing by the late Capt. C. N. B. Macauley, United States Army.

Dr. Washington Matthews[2] describes

[1] Capt. John G. Bourke gave the Apache name of this game to the writer as *Tze-chis* or *Zse-tilth*, the two words, "stone" and "wood" referring to the central stone and the staves. The circle of stones is called, he stated, *Tze-nasti*, "stone circle." Mr. Edward Palmer gives the name of the game as *Satill.*

[2] Navajo Legends, Boston, 1897, note 47, p. 219.

a game played by Navajo women under the name of Tsĕ *d* ĭ′*l* or tsĭn-*d* ĭ′*l*:[1]

The principal implements are three sticks, which are thrown violently, ends down, on a flat stone around which the gamblers sit. The sticks rebound so well that they would fly far away were not a blanket stretched overhead to throw them back to the players. A number of small stones placed in the form of a square are used as counters. These are not moved, but sticks, whose positions are changed according to the fortunes of the game, are placed between them. The rules of the game have not been recorded.

Dr. Matthews[2] tells, among the early events of the fifth or present world, that while they were waiting for the ground to dry, the women erected four poles, on which they stretched a deerskin, and under the

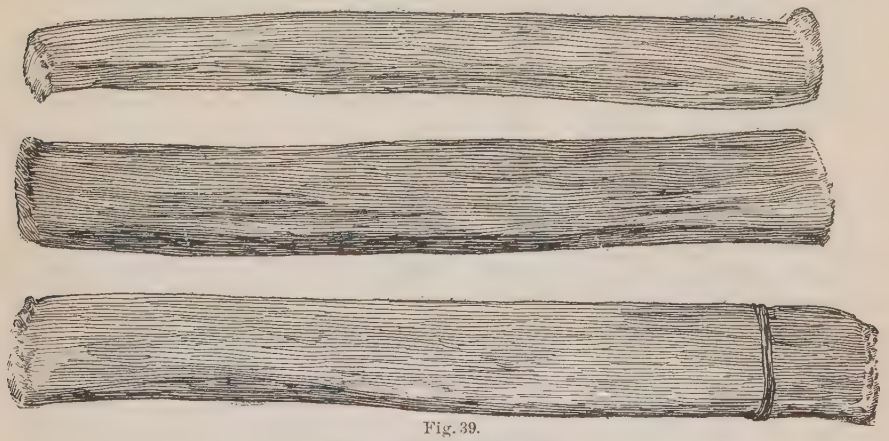


Fig. 39.
SET OF STAVES FOR GAME.
Length, 8 inches.
Navajo Indians, New Mexico.
Cat. No. 9557, U.S.N.M.

shelter of this they played the game of three sticks, tsĭn*dĭ*, one of the four games which they brought with them from the lower world.[3]

Another game of tossed sticks described by Dr. Matthews[4] was called *t*aká-*t*had-sáta,[5] or the thirteen chips.

It is played with 13 thin flat pieces of wood, which are colored red on one side and left white or uncolored on the other. Success depends on the number of chips which, being thrown upward, fall with their white sides up.

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[1] *Tsĭn* = wood, *dĭ′l*?

[2] Navajo Origin Legend, The Story of the Emergence, II (see p. 185).

[3] The other games were: *d*ilkon, played with two sticks, each the length of an arm; atsá, played with forked sticks and a ring, and aspĭ′n.

[4] Navajo Legends, p. 83.

[5] *T*aká-*t*had-sáta was the first of four games played by the young *H*astsé*h*o*g*an with the gambling god No*h*oílpi. These four games are not the same as the four described as brought from the under world. They comprise, in addition, nánzoz, "hoop and pole;" tsĭ′nbelsi*l*, or push on the wood, in which the contestants push on a tree until it is torn from its roots and falls, and tsol, or ball, the object in which was to hit the ball so that it would fall beyond a certain line. Compare the gambling episode with that of Póshaiyăanne, the Sia culture hero and the Magician. The four games played by them were not the same (see p. 730).

NAVAJO. Arizona. (Cat. No. 74735, U.S.N.M.)

Set of seven blocks of cedar wood, $\frac{3}{4}$ inch in length, $\frac{7}{16}$ inch wide, and $\frac{1}{4}$ inch thick (fig. 40). Section hemispherical. Six have flat sides blackened and one painted red; opposite unpainted. Collected by Dr. Washington Matthews, U. S. A. The game was "played with counters by women." These blocks furnish an exact parallel to the Korean "chestnut" *nyout.*

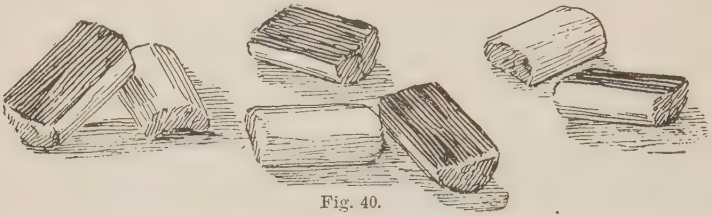

Fig. 40.
SET OF BLOCKS FOR GAME.
Length, $\frac{3}{4}$ inch.
Navajo Indians, Arizona.
Cat. No. 74735, U.S.N.M.

BEOTHUKAN STOCK.

BEOTHUK. Newfoundland.

From colored drawings of ancient bone disks, attributed to the Beothuk, and presented to the United States National Museum by Lady Edith Blake, of Kingston, Jamaica, it would appear that this tribe may have used gaming disks resembling those of the Micmac.

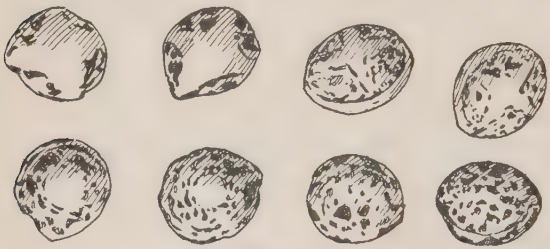

Fig. 41.
SET OF PLUM STONES FOR GAME.
Diameter, $\frac{1}{16}$ inch.
Arikara Indians.
Cat. No. 6355, U.S.N.M.

CADDOAN STOCK.

ARIKARA. (Cat. Nos. 6342, 6355, U.S.N.M.)

Set of eight plum stones, plain on one side, and marks burned upon the other, as shown in fig. 41. Four have stars on burned ground; two, circular marks, and two are entirely burned over. Basket of woven grass, 7 inches in diameter at top, and 2 inches deep. Collected by Dr. Gray and Mr. Matthew F. Stevenson.

Brackenridge,[1] referring to the Arikara, states:

> In the evening, about sundown, the women cease from their labors and collect into little knots, and amuse themselves with a game something like jackstones. Five pebbles are tossed up in a small basket, with which they endeavor to catch them again as they fall.

[1] H. M. Brackenridge, Views of Louisiana, together with a Journal of a voyage up the Missouri River in 1811, Pittsburg, 1814.

It seems hardly necessary to point out that he failed to comprehend the object of the game.

PAWNEE.

In reply to a letter addressed by the writer to Mr. George Bird Grinnell, of New York City, he kindly wrote the following account "of what the Pawnee call the seed game:"

I have seen this game played among the Pawnee, Arikara, and Cheyenne, and substantially in the same way everywhere. The Pawnee do not use a bowl to throw the seeds, but hold them in a flat wicker basket, about the size and shape of an ordinary tea plate. The woman who makes the throw holds the basket in front of her close to the ground; gives the stones a sudden toss into the air, and then moves the basket smartly down against the ground, and the stones fall into it. They are not thrown high, but the movement of the basket is quick, and it is brought down hard on the ground so that the sound of the slapping is easily heard. The plum stones are always five in number, blackened, and variously marked on one side. The women who are gambling sit in line opposite to one another, and usually each woman bets with the one sitting opposite her, and the points are counted by sticks placed on the ground between them, the wager always being on the game, and not on the different throws. It is exclusively, so far as I know, a woman's game.

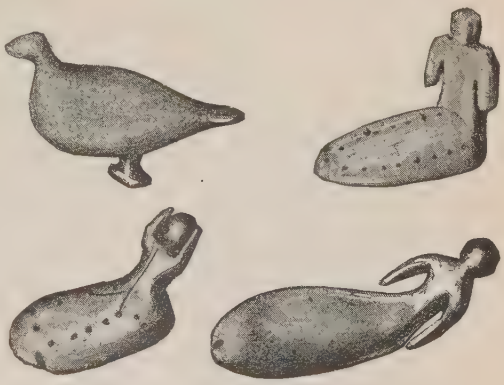

Fig. 42.

IVORY IMAGES USED AS DICE IN GAME OF TINGMIUJANG.

Central Eskimo.

From Sixth Annual Report of the Bureau of Ethnology.

Pike[1] says:

The third game alluded to is that of *la platte*, described by various travelers (as the platter or dish game); this is played by the women, children, and old men, who, like grasshoppers, crawl out to the circus to bask in the sun, probably covered only with an old buffalo robe.

ESKIMAUAN STOCK.

Speaking of the Central Eskimo, Dr. Franz Boas[2] says:

A game similar to dice, called *tingmiujang*, i. e., images of birds, is frequently played. A set of about fifteen figures, like those represented in fig. 42, belong to this game; some representing birds, others men and women. The players sit around a board or a piece of leather and the figures are shaken in the hand and thrown upward. On falling, some stand upright, others lie flat on the back or on the side. Those standing upright belong to that player whom they face; sometimes they are so thrown that they all belong to the one that tossed them up. The players throw by turns until the last figure is taken up, the one getting the greatest number of figures being the winner.

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[1] Elliott Coues, The Expedition of Zebulon Montgomery Pike, New York, 1895, p. 534.

[2] The Central Eskimo, Sixth Annual Report of the Bureau of Ethnology, Washington, 1888, p. 567.

Mr. John Murdoch[1] describes similar objects which he purchased at Plover Bay, eastern Siberia, in 1881 (fig. 43). They were supposed to be merely works of art. Referring to the account given by Dr. Boas of their use as a game, he says:

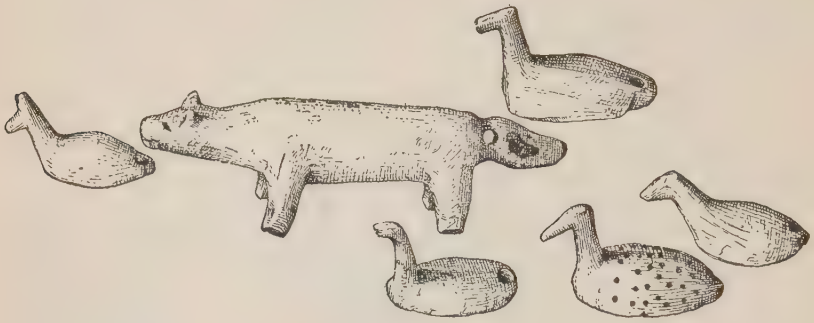


Fig. 43.

GAME (?) OF FOX AND GEESE.

After Murdoch.

It is therefore quite likely they were used for a similar purpose at Plover Bay. If this be so, it is a remarkable point of similarity between these widely separated Eskimo, for I can learn nothing of a similar custom at any intermediate point.

Mr. Murdoch refers to the game as mentioned by Captain Hall,[2] who, speaking of the Central Eskimo, says:

They have a variety of games of their own. In one of these they use a number of bits of ivory made in the form of ducks.

Fig. 44.

CARVED IVORY WATER BIRDS AND SEAL.

St. Lawrence Island, Siberia.

Cat. No. 63457, U.S.N.M.

In the United States National Museum (Cat. No. 63457) there is a set of carved water birds and a seal (fig. 44), collected from the Eskimo at St. Lawrence Island, Alaska, by Mr. E. W. Nelson, in 1882. He informs me, through Prof. Otis T. Mason, that he never saw the flat-

[1] Ethnological Results of the Port Barrow Expedition, Ninth Annual Report of the Bureau of Ethnology, Washington, 1892, p. 364.

[2] Charles Francis Hall, Arctic Researches, New York, 1860, p. 570.

bottomed geese and other creatures used in a game, and all of his specimens are perforated and used as pendants on the bottom of personal ornaments and parts of clothing.

Prof. Benjamin Sharp, of the Academy of Natural Science, tells me that he saw the carved water birds used as a game, being tossed and allowed to fall by Eskimo of St. Lawrence Bay, Siberia.

In reply to my inquiry in reference to the use of such objects in games by the Arctic Highlanders of Greenland, Mr. Henry G. Bryant writes me that small images of birds are rare among them, although

Fig. 45.

WOODEN BLOCKS, SAID TO BE USED IN GAME.

Length, 1⅞ inches.

Northwest Arctic Coast.

Cat. No. 7404, U.S.N.M.

representations of men, women, walrus, seal, bears, and dogs are part of the domestic outfit of every well-regulated family.[1]

I understand that the leg bones of the arctic fox are sometimes tied together on a string, and at times these are thrown up and their position noted when striking the ground.

Mr. Bryant adds:

Perhaps they attach a significance to the position of the fox bones, which may be analogous to the practice of using wooden or bone dice by other tribes.

A set of carved ivory tablets (figs. 195–200), strung upon a throng, are described as among the properties of an Eskimo shaman in

[1] Mr. Bryant states that these miniature figures, which are made of ivory, are employed to teach children the arts of the chase.

Alaska. It is possible that they are used in the same manner as the fox bones.

In the United States National Museum (Cat. No. 7404) are four wooden blocks, said to be used in a game, from the Northwest Arctic Coast. These blocks (fig. 45), which were collected by Mr. R. Kennicott, have a rounded base marked with two transverse cuts. They are perforated as if for stringing. From the locality given they are probably Eskimauan.

In conclusion, reference should be made to a game described by Murdoch[1] among the Point Barrow Eskimo with twisters and marline spikes used for backing the bow.

Lieutenant Ray says he has seen it played with any bits of stick or bone. According to him the players are divided into sides, who sit on the ground about 3 yards apart, each side sticking up one of the marline spikes for a mark to throw the twisters at. Six of the latter, he believes, make a complete set. One side tosses the whole set, one at a time, at the opposite stake, and the points which they make are counted up by their opponents from the position of the twisters as they fall. He did not learn how the points were reckoned, except that twisters with a mark on

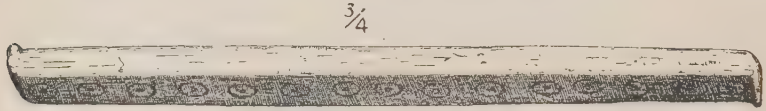


Fig. 46.

TWISTERS USED IN GAME.

Length, 5⅞ inches.

Point Barrow Eskimo.

After Murdoch.

them counted differently from the plain ones, or how long the game lasted, each side taking its turn of casting at the opposite stake. He, however, got the impression that the winning side kept the twisters belonging to their opponents. Mr. Nelson informs me that a similar game is played with the same implements at Norton Sound.

The present writer has repeated this account, from the general likeness of the implements (sinew twisters) (fig. 46) to the staves tossed as dice, rather from any clearly apparent identity of the games.

IROQUOIAN STOCK.

CHEROKEE. North Carolina.

I am informed by Mrs. Starr Hayes that the Cherokee play a game in a flat square basket of cane like the lid of a market basket, with colored beans, under the name of "Black eye and white eye." The shallow basket used is 1½ feet square. The beans are colored "butter beans," a variety of lima, and those selected are dark on one side and white on the other. Twelve beans are kept as counters. Six others are put in the basket, as they come, and the players, who are four in number, and each two partners, play in turn. The basket is held in

[1] Ninth Annual Report of the Bureau of Ethnology, p. 364.

both hands, slightly shaken, and then with a jerk, the beans are tossed in the air. If all turn black, two are taken from the counters; if all turn white, three are taken. If but one turns up white, one is taken from the twelve. When they turn five white, one only is taken. The game is played three or six times weekly. Whoever gets twelve beans has the game.

DELAWARE.

See account by Loskiel on page 725.

HURON. Ontario, Canada.

Charlevoix[1] gives the following account:

As I returned through a quarter of the Huron village I saw a company of these savages, who appeared very eager at play. I drew near and saw they were playing at the game of the dish (*jeu du plat*). This is the game of which these people are fondest. At this they sometimes lose their rest, and in some measure their reason. At this game they hazard all they possess, and many do not leave off till they are almost stripped quite naked and till they have lost all they have in their cabins. Some have been known to stake their liberty for a time, which fully proves their passion for this game; for there are no men in the world more jealous of their liberty than the savages.

The game of the dish, which they also call the game of the little bones (*jeu des osselets*), is only played by two persons. Each has six or eight little bones, which at first I took for apricot-stones; they are of that shape and bigness. But upon viewing them closely I perceived they had six unequal surfaces, the two principal of which are painted, one black and the other white, inclined to yellow. They make them jump up by striking the ground or the table with a round and hollow dish, which contains them and which they twirl round first. When they have no dish they throw the bones up in the air with their hands; if in falling they come all of one color, he who plays wins five. The game is forty up, and they subtract the numbers gained by the adverse party. Five bones of the same color win but one for the first time, but the second time they win the game. A less number wins nothing.

He that wins the game continues playing. The loser gives his place to another, who is named by the markers of his side; for they make the parties at first, and often the whole village is concerned in the game. Oftentimes also one village plays against another. Each party chooses a marker; but he withdraws when he pleases, which never happens but when his party loses. At every throw, especially if it happens to be decisive, they make great shouts. The players appear like people possessed, and the spectators are not more calm. They all make a thousand contortions, talk to the bones, load the spirits of the adverse party with imprecations, and the whole village echoes with howlings. If all this does not recover their luck, the losers may put off the party to the next day. It costs them only a small treat to the company. Then they prepare to return to the engagement. Each invokes his genius, and throws some tobacco in the fire to his honor. They ask him above all things for lucky dreams. As soon as day appears they go again to play; but if the losers fancy the goods in their cabins made them unlucky the first thing they do is to change them all. The great parties commonly last five or six days, and often continue all night. In the meantime, as all the persons present, at least those who are concerned in the game, are in agitation that deprives them of reason, as they quarrel and fight, which never happens among savages but on these occasions and in drunkenness, one may judge if when they have done playing they do not want rest.

[1] P. de Charlevoix, Journal d'un Voyage dans l'Amerique Septentrionnale, Paris, 1744, III, p. 259 (Juin, 1721).

It sometimes happens that these parties of play are made by order of the physician or at the request of the sick. There needs for this purpose no more than a dream of one or the other. This dream is always taken for the order of some spirit, and they prepare themselves for the game with a great deal of care. They assemble for several nights to try and to see who has the luckiest hand. They consult their genii, they fast, the married persons observe continence, and all to obtain a favorable dream. Every morning they relate what dreams they have had and of all the things they have dreamt of which they think lucky and they make a collection of all and put them into little bags which they carry about with them, and if anyone has the reputation of being lucky—that is, in the opinion of these people, of having a familiar spirit more powerful or more inclined to do good—they never fail to make him keep near him who holds the dish. They even go a great way sometimes to fetch him, and if through age or any infirmity he can not walk, they will carry him on their shoulders.

They have often pressed the missionaries to be present at these games, as they believe their guardian genii are the most powerful.

Brebeuf[1] describes the game as follows:

The game is also in great repute as a medicine, especially if the sick has dreamed of it. This game is a game of chance, pure and simple. They take six prune stones, white on one side and black on the other, put them in a plate, and shake the latter violently, so that the bones fall to the ground, showing one or the other side, as it may happen. The game is to get either all with the black side or all with the white side up. Generally they play village pitted against village. They all convene in a hut, and take places on benches ranged along the sides. The sick is carried in a coverlet, and the one who is to shake the plate (there is only one player for each side) walks after the sick, head and face wrapped in his robe. As soon as the player of the opposing party takes hold of the plate they cry aloud, *Achinc achinc, achinc, trois, trois, trois,* or rather, *ioio, ioio, ioio,* desiring that either three white or three black be thrown by him. This winter you would have seen a good many returning to their village, having lost their breeches at a time when there was nearly 3 feet of snow, as frolicsome as if they had won. What I find the most remarkable thing about it is the preliminary arrangements. Some of them fast several days before the game is to take place. The evening before they convene in a hut, and by a ceremony try to find out the result of the game. The one who is chosen to hold the plate takes the stones, puts them in the plate, which he covers, so that nobody can touch them. After this they sing. After the song the plate is uncovered, and the stones are either all black or all white.

Thereupon I asked a savage whether the opposing party did not do the same, and whether they could not get the stones arranged in the same way. He answered "*Yes.*" "Nevertheless," I said, "both can not win," which he did not know how to answer. He told me, further, two remarkable things:

1. They choose for holding the plate someone who had dreamed that he won or who had a charm. Generally those who have one do not make a secret of it, but carry it about with them. They say that one person in our village rubs the stones with a certain ointment and never fails to win.

2. In making the trial some of the stones disappear and are found after a time in the plate with the others.

Father Lalemant[2] relates the following:

One of the latest foolish things which has happened in this village was occasioned by a sick person in one of the neighboring villages, who, in order to regain his health, dreamed or really got the prescription of the local medicine man that a "game of platter" should be played for him. He spoke about it to the headmen,

[1] Relations des Jesuites, Relation en l'Année, 1636, Quebec, 1858, p. 113.
[2] *Idem.*, 1639, p. 95.

who soon convened the council and decided upon the date and the village which should be invited for this purpose, and this village was ours. A deputation was sent thence here to make the proposition, which was agreed upon, and then the necessary preparations were made by both parties.

This "game of platter" consists in tossing about in a wooden dish several wild-plum pits, each being white on one side and black on the other, from which follows gain or loss, according to the rules of the game.

It is beyond my power to describe properly the earnestness and activity displayed by our Barbarians in getting ready and in seeking all means and signs of good luck and success in their game. They meet at night and pass part of it in shaking the plate to see who is the most adroit, and part in spreading out their charms and exhorting them. Toward the end they all sleep in the same cabin, having previously fasted and abstained for some time from their wives, all this to have a lucky dream, and the next morning they tell what has happened in the night. Finally, everything that they have dreamed could bring them good luck is collected and placed in bags for carrying. Besides this, they search everywhere for those who have charms affecting the game, or "Ascandics" or familiar spirits to assist the one who holds the dish, and be nearest him when he shakes it. If there are any old men whose presence is recognized as efficacious in increasing the strength and value of their charms, not content with carrying their charms, they load them on the shoulders of the young men in order to carry them to the place of assembly. As we pass in the country for powerful sorcerers, they do not fail to give us notice to pray and perform many ceremonies to cause them to win.

As soon as they arrive at their appointed place, each party ranges itself along one or the other side of the cabin, filling it from top to bottom, under and above the "andichons," which are of bark and made like a bed canopy or roof, corresponding to that below, fastened to the ground upon which they sleep at night. They place themselves upon the poles that lie and are suspended along the length of the cabin. The two players are in the middle with their seconds who hold the charms. Everyone present bets with someone else whatever he pleases, and the game begins.

It is at this moment that everyone sets to praying or muttering I know not what words, with gestures and violent agitations of the hands, eyes, and the entire face, all for the purpose of attracting good fortune to themselves and exhorting their particular spirits to take courage and not let themselves be worried. Some are appointed to utter execrations and make contrary gestures for the purpose of forcing bad luck upon the other side and frightening the familiar spirits of the opposing party.

This game was played several times this winter throughout all the country, but I do not know how it happened that the villages where we have missions were always unlucky to the last degree, and a certain village lost 30 porcelain (wampum) collars each of 1,000 beads, which is in this country, as if we said in France, 50,000 pearls or *pistoles*.[1] But this is not all. Always hoping to regain what they have lost, they bet tobacco bags, clothes, shoes, and breeches, in a word, all they possess, so that, if they are unlucky, as happened to these people, they return home stark-naked, having lost even their breech-clouts.

Nicolas Perrott[2] says:

The savages have also a sort of game of dice, the box of which is a wooden plate, well rounded and well polished on both sides. The dice are made of six small flat

[1] The term *pistole* was used only as a money of account. It was generally equivalent to 10 *livres tournois*. The *livre tournois* was of 20 *sous*, in distinction from the *livre* of Paris of 25 sous. What the actual value would be no one can tell. It may be said that 50,000 *pistoles* was equal to 500,000 *livres tournois* at that time. (Personal letter from Prof. Dana C. Munro.)

[2] Memoire sur les Moeurs, Coustumes et Religion des Sauages de l'Amerique Septentrionale, Leipzig et Paris, 1864, p. 50.

pieces of bone, about the size of a plum stone. They are all alike, having one of the faces colored black, red, green, or blue, and the other generally painted white or any different color from the first-mentioned face. They throw these dice in the plate, holding the two edges, and on lifting it they make them jump and turn therein. After having struck the dish on the cloth, they strike themselves at the same time heavy blows on the chest and shoulders while the dice turn about, crying "Dice! Dice! Dice!" until the dice have stopped moving. When they find five or six showing the same color, they take the grains which have been agreed upon with the opposite party. If the loser and his comrades have nothing more to play with, the winner takes all that is on the game. Entire villages have been seen gambling away their possessions, one against the other, on this game, and ruining themselves thereat. They also challenge to a decision by one throw of the die, and when it happens that a party throws six, all those of the tribe that bet on him get up and dance in cadence to the noise of gourd rattles. All passes without dispute. The women and girls also play this game, but they often use eight dice and do not use a dicebox like the men. They only use a blanket, and throw them on with the hand.

Sagard Theodat[1] says:

The men are addicted not only to the game of reeds (which they call "Aefcara," with three or four hundred small white reeds, cut equally to a length of a foot), but also addicted to other kinds of game, as for instance, taking a large wooden platter with five or six plum stones or small balls, somewhat flattened, about the size of the end of the little finger, or painted black on one side and white on the other. They squat all around in a circle and take each his turn in taking hold of the platter with both hands, which they keep at a little distance from the floor, and bring the platter down somewhat roughly, so as to make the balls move about; they take it as in a game of dice, observing on which side the stones lie, whether it goes against them or for them. The one who holds the platter says, continually while striking it, "Tet, tet, tet," thinking that this may excite and influence the game in his favor.

For the ordinary game of women and girls (at times joined by men and boys) are used five or six stones (as those of apricots) black on one side and yellow on the other, which they hold in their hands as we do dice, throwing the stones a little upward, and after they have fallen on the skin which serves them as a carpet, they see what the result is, and continue to play for the necklaces, ear ornaments, and other small articles of their companions, but never for gold or silver coin, because they do not know the use of it, so that in trade they barter one thing for another.

I must not forget to mention that in some of their villages they play, which we call in France, *Porter les Momons* (carry the challenge). They send a challenge to other villages to come and play against them, winning their utensils, if they can, and meanwhile the feasting does not stop, because at the least inducement the kettle is on the fire, especially in winter time, at which time they especially feast and amuse themselves in order to pass agreeably the hard season.

HURON (Wyandot).

Col. James Smith[2] describes the Wyandot as "playing a game resembling dice or hustle-cap. They put a number of plum-stones in a small bowl; one side of each stone is black and the other white; then they shake or hustle the bowl, calling *hits*, *hits*, *hits*, *honesey*,

[1] Histoire du Canada, Paris, 1866, p. 243.

[2] An account of the Remarkable Occurrences in the Life and Travels of Col. James Smith during his Captivity with the Indians in the years 1755–1759, Cincinnati, 1870, p. 46.

honesey, rago, rago; which signifies calling for white or black, or what they wish to turn up; then they turn the bowl and count the whites and blacks."

IROQUOIS. Western Pennsylvania and southern New York.

Loskiel[1] gives the following account:

The Indians are naturally given to gambling, and frequently risk their arms, furniture, clothes, and all they possess to gratify this passion. The chief game of the Iroquois and Delawares is dice, which indeed originated with them. The dice are made of oval and flattish plum-stones, painted black on one and yellow on the other side. Two persons only can play at one time. They put the dice into a dish, which is raised alternately by each gambler and struck on the table or floor with force enough to make the dice rise and change their position; when he who has the greater number of winning color counts five, and the first who has the good fortune to do this eight times wins the game. The spectators seem in great agitation during the game, and at every chance that appears decisive cry out with great vehemence. The gamblers distort their features, and if unsuccessful mutter their displeasure at the dice and the evil spirits who prevent their good fortune. Sometimes whole townships, and even whole tribes, play against each other. One of the missionaries happened to be present when two Iroquois townships, having got together a number of goods, consisting of blankets, cloth, shirts, linen, etc., gambled for them. The game lasted eight days. They assembled every day, and every inhabitant of each township tossed the dice once. This being done, and the chance of each person noted down, they parted for the day. But each township offered a sacrifice in the evening to insure success to their party. This was done by a man going several times around a fire, throwing tobacco into it, and singing a song. Afterwards the whole company danced. When the appointed time for the game was at an end they compared notes, and the winner bore away the spoil in triumph.

MOHAWK. New York.

Bruyas[2] in his radical words of the Mohawk language, written in the latter part of the seventeenth century, gives under *Atnenha*, "Noyau" (stone of a fruit), the compounds *T8atnenha8inneton*, "jouer avec les noyaux comme sont les femmes, en les jettant la main," and *T8atenna8eron*, "y jouer au plat."

ONONDAGA. New York.

Rev. W. M. Beauchamp[3] states:

Among the Onondaga now eight bones or stones are used, black on one side and white on the other. They term the game *Ta-you-nyun-wát-hah* or, "Finger Shaker," and from one hundred to three hundred beans form the pool, as may be agreed. With them it is also a household game. In playing this the pieces are raised in the hand and scattered, the desired result being indifferently white or black. Essentially the counting does not differ from that given by Morgan (see p. 726). Two white or two black will have six of one color, and these count two beans, called *O-yú-ha*, or the Bird. The player proceeds until he loses, when his opponent takes his turn. Seven white or black gain four beans, called *O-nńo-sah*, or Pumpkin. All white or all black gain twenty, called *O-hén-tah*, or a Field. These are all that draw anything, and we may indifferently say with the Onondaga, two white or black

[1] George Henry Loskiel, History of the United Brethren, London, 1794, I, p. 106.

[2] Rev. Jacques Bruyas, Radices verborum Iroquæorum, New York, 1863. Cited by Andrew McFarland Davis, Bulletin of the Essex Institute, XVIII, p. 185.

[3] Iroquois games, Journal of American Folk Lore, IX, p. 269.

for the first, or six with the Seneca. The game is played singly or by partners, and there is no limit to the number. Usually there are three or four players.

In counting the grains there is a kind of ascending reduction; for as two birds make one pumpkin, only one bird can appear in the result. First come the twenties, then the fours, then the twos, which can occur but once. Thus we may say for twenty, *Jo-han-tó-tah*, "you have one field" or more, as the case may be. In fours we can only say *Ki-yae-ne-you-sáh-ka*, "you have four pumpkins," for five would make a field. For two beans there is the simple announcement of *O-yú-ah*, "bird."

The game of peach-stones, much more commonly used and important, has a more public character, although I have played it in an Indian parlor. In early days the stones of the wild plum were used, but now six peach-stones are ground down to an elliptic flattened form, the opposite sides being black or white. This is the great game known as that of the dish nearly three centuries ago. The wooden bowl which I used was 11 inches across the top and 3 inches deep, handsomely carved out of a hard knot. A beautiful small bowl, which I saw elsewhere, may have been used by children. The six stones are placed in the *Kah-oón-wah*, the bowl, and thence the Onondaga term the game *Ta-yune-oo-wáh-es*, throwing the bowl to each other as they take it in turn. In public playing two players are on their knees at a time, holding the bowl between them. Beans are commonly used for counters. Many rules are settled according to agreement, but the pumpkin is left out, and the stones usually count five for a bird and six for a field. All white or all black is the highest throw, and five or six are the only winning points. In early days it would seem that all white or all black alone counted. The bowl is simply struck on the floor. This ancient game is used at the New Year's or White Dog Feast among the Onondaga yet. Clan plays against clan, the Long House against the Short House, and, to foretell the harvest, the women play against the men. If the men win, the ears of corn will be long like them; but if the women gain the game, they will be short, basing the results on the common proportion of the sexes. As of old, almost all games are yet played for the sick, but they are regarded now more as a diversion of the patient's mind than a means of healing. The game of the dish was once much used in divination, each piece having its own familiar spirit. But it is more commonly a social game now.

SENECA. New York.

Morgan[1] describes the Iroquois game under the name of *Gus-ga-e-sá-tä*, or "deer-buttons."

This was strictly a fireside game, although it was sometimes introduced as an amusement at the season of religious councils, the people dividing into tribes as usual and betting upon the result. Eight buttons, about an inch in diameter, were made of elk horn, and, having been rounded and polished, were slightly burned upon one side to blacken them [fig. 47]. When it was made a public game it was played by two at a time, with a change of players as elsewhere described in the Peach-stone game. At the fireside it was played by two or more, and all the players continued in their seats until it was determined. A certain number of beans (fifty perhaps) were made the capital, and the game continued until one of the players had won them all. Two persons spread a blanket and seated themselves upon it. One of them shook the deer-buttons in his hands and then threw them down. If six turned up of the same color, it counted two; if seven, it counted four; and if all, it counted twenty, the winner taking as many beans from the general stock as he made points by the throw. He also continued to throw as long as he continued to win. When less than six came up, either black or white, it counted nothing, and the throw passed to the other player. In this manner the game was continued until the beans were taken up between the two players. After that the one paid to the other out of

[1] League of the Iroquois, Rochester, 1851, p. 302.

his own winnings, the game ending as soon as the capital in the hands of either player was exhausted. If four played, each had a partner or played independently, as they were disposed; but when more than two played, each one was to pay the winner the amount won. Thus, if four were playing independently, and after the beans were distributed among them, in the progress of the game one of them should turn the buttons up all black or all white, the other three would be obliged to pay

Fig. 47.

GUS-GA-E-SÁ-TÄ, OR DEER-BUTTONS.

Seneca Indians, New York.

After Morgan.

him twenty each; but if the beans were still in bank, he took up but twenty. The deer buttons were of the same size. In the figure [fig. 47] they are represented at different angles.

An ancient and favorite game of the Iroquois, *Gus-kä'-eh*, was played with a bowl and peach-stones. It was always a betting game, in which the people divided by tribes. By established custom, it was introduced as the concluding exercise on the last day of the Green Corn and the Harvest festivals, and also of the New Year's jubilee. Its introduction among them is ascribed to the first *To-do-dä'-ho*, who flourished at the formation of the League. A popular belief prevailed that this game would be enjoyed by them in the future life—in the realm of the Great Spirit—which is perhaps but an extravagant way of expressing their admiration for the game. A dish about a foot in diameter at the base was carved out of a knot or made of earthen. Six peach-stones were then ground or cut down into an oval form, reducing them in the process about half in size, after which the heart of the pit was removed and the stones themselves were burned upon one side to blacken them. The above representation [figs. 48, 49] will exhibit both the bowl and the peach-stones, the latter being drawn in different positions to show the degree of their convexity.

Fig. 48.

GUS-KÄ'-EH, OR PEACH STONES.

Seneca Indians, New York.

After Morgan.

It was a very simple game, depending, in part, upon the dexterity of the player, but more upon his good fortune. The peach-stones were shaken in the bowl by the player, the count depending upon the number which came up of one color after they

had ceased rolling in the dish. It was played in the public council-house by a succession of players—two at a time—under the supervision of managers appointed to represent the two parties and to conduct the contest. Its length depended somewhat upon the number of beans which made the bank—usually one hundred—the victory being gained by the side which finally won them all.

A platform was erected a few feet from the floor and spread with blankets. When the betting was ended, and the articles had been delivered into the custody of the managers, they seated themselves upon the platform in the midst of the throng of spectators, and two persons sat down to the game between the two divisions into which they arranged themselves. The beans, in the first instance, were placed together in a bank. Five of them were given each player, with which they commenced. Each player, by the rules of the game, was allowed to keep his seat until he had lost this outfit, after which he surrendered it to another player on his own side selected by the managers of his own party. And this was the case, notwithstanding any number he might have won of his adversary. Those which he won were delivered to his party managers. The six peach-stones were placed in the bowl and shaken by the player; if five of them came up of one color, either white or black, it counted one, and his adversary paid to him the forfeit, which was one bean; the bean simply representing a unit in counting the game. On the next throw, which the player having won retained, if less than five came up of the same color it counted nothing, and he passed the bowl to his adversary. The second player then shook the bowl; upon which, if they all came up of one color, either white or black, it counted five. To pay this forfeit required the whole outfit of the first player, after which, having nothing to pay with, he vacated his seat and was succeeded by another of his own side, who received from the bank the same number of beans the first had. The other player followed his throw as long as he continued to win; after which he repassed the bowl to his adversary. If a player chanced to win five and his opponent had but one left, this was all he could gain. In this manner the game continued, with varying fortune, until the beans were divided between the two sides in proportion to their success. After this the game continued in the same manner as before, the outfit of each new player being advanced by the managers of his own party; but as the beans or counters were now out of sight, none

Fig. 49.

GA-JIH, OR BOWL FOR GAME.

Seneca Indians, New York.

After Morgan.

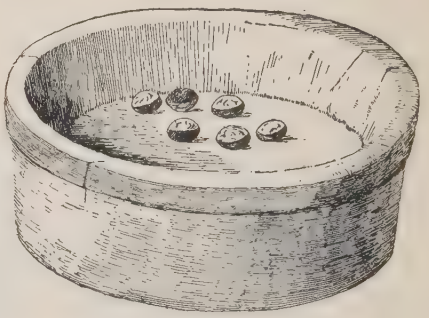


Fig. 50.

PEACH STONE BOWL GAME.

Greatest diameter of bowl, 9⅜ inches.

Seneca Indians, New York.

Collected by J. N. B. Hewitt.

BONE GAMING DISKS.
Diameter, ⅞ inch.
Seneca Indians, New York.
Cat. No. 21073, Museum of Archæology, University of Pennsylvania.

but the managers knew the state of the game with accuracy. In playing it there were but two winning throws, one of which counted one and the other five. When one of the parties had lost all their beans, the game was done.

The implements for a Seneca bowl game in the possession of Mr. John N. B. Hewitt, of the Bureau of American Ethnology, obtained by him from the Seneca Indians, Cattaraugus Reservation, Cattaraugus County, New York, consist of a wooden bowl (fig. 50), $9\frac{3}{8}$ inches in diameter, and six dice made of fruit stones. A set of bone gaming disks from the same tribe and place, also in his possession, are represented in plate 6. As will be seen, they are eight in number, and marked on one side, in a similar way to those of the Micmac and Penobscot.

TUSCARORA (?), North Carolina.

Referring to the North Carolina Indians, Mr. John Lawson[1] writes:

They have several other games, as with the kernels or stones of persimmons, which are in effect the same as our dice, because winning or losing depends on which side appears uppermost and how they happen to fall together.

Again, speaking of their gambling, he says[2]:

Their arithmetic was kept with a heap of Indian grain.

He does not specify this game as played by any particular tribe in North Carolina, and it was probably common to all of them.

KERESAN STOCK.

LAGUNA. New Mexico.

Capt. George H. Pradt, of Laguna, writes as follows:

The game played with a circle of small stones is called, by the Keres pueblos, "Ka-wá-su-kuts."[3] The stones number forty, and are divided into tens by openings called doors or gates called "Si-am-ma;" the doors are placed north, south, east, and west.

In the center of the circle is placed a flat stone, upon which are thrown the three counters. These are flat pieces of wood about 4 inches long, $\frac{1}{2}$ inch wide, and $\frac{1}{8}$ inch thick; painted black on one side, and marked with 2, 3, and 10 marks, respectively. The counters are firmly grasped with the ends down, and forcibly thrown (ends down) on the stone in the center, in such a manner that they will rebound, and the marks, if any are uppermost, are counted, and the player lays his marker (a small stick like a pencil) between the stones the proper distance from the starting point to record the number. The starting point is one of the "doors," whichever is selected, and the game is played by any number that can assemble around the circle. A player can go around the circle in either direction, but if another player arrives at the same point he "kills" the previous player and that one is obliged to go back to the starting point; the first one making the circuit successfully wins the game, which is generally played for a small stake. The game is modified sometimes by ruling that if a player falls into one of the doors he must go back, but in this case the player is not obliged to go back if another happens to mark as many points as he.

Sometimes a round stone is painted to resemble a face and has a wreath of ever-

[1] The History of North Carolina, London, 1719, p. 176.

[2] Page 27.

[3] Meaning a "punch" or sudden blow, the only name the Laguna have for it. (G. H. P.)

greens placed around it, and is used as a mascot; it is placed to one side of the circle and is appealed to by the players to give them good numbers; this mascot is generally called "Kûm-mûshk-ko-yo," a traditional fairy or witch. The name means "the old spider woman."

SIA. New Mexico.

Mrs. Matilda Coxe Stevenson[1] describes the game as played by the Sia under the name of *Wash'kasi.*

Forty pebbles form a square, ten pebbles on a side, with a flat stone in the center of the square (fig. 51). Four flat blocks, painted black on one side and unpainted on the other, are held vertically and dropped upon the stone.

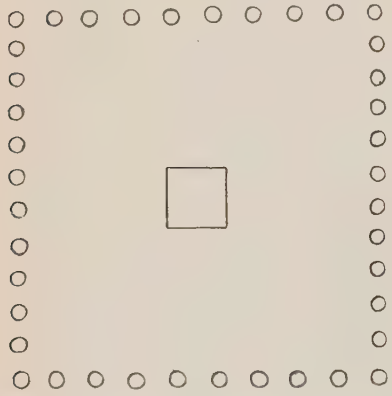


Fig. 51.

CIRCUIT FOR SIA STAVE GAME.

After Stevenson.

The counts are as follows:

4 painted sides up	= 10
4 unpainted sides up	= 6
3 painted sides up	= 3
2 painted sides up	= 2
1 painted side up	=

The players move in opposite directions, both starting at one of the corners. The game is described as the first of four games played by Po'shaiyänne, the Sia culture hero, with the tribal priest. The stake was the latter's house in the north. The second of the four games is of the bowl class, which I have included in this series. The stake in this game was the *ti'ämoni*, or priest's, house in the west. It was played with six 2-inch cubes, which were highly polished and painted on one side. These were tossed up in a large bowl held with each hand. "When three painted sides are up, the game is won; with only two painted sides up, the game is lost. Six painted sides up is equivalent to a march in euchre." The games that followed were, first, a game played with four sticks with hollow ends, under one of which a pebble was hidden. This was played for the priest's house in the south. Second, a game played with four little mounds of sand, in one of which a small round stone was hidden. This was played for the priest's house in the east. The games were then repeated in the same order commencing with *Wash'kasi* for the house in the zenith, the game with the six blocks for the house in the nadir, and finally, the third in order, that with the four sticks with hollow ends, for all the people of the tribe.

Mr. Charles F. Lummis informs me he has witnessed the game with the staves or blocks in the following pueblos belonging to this stock: Acoma, Cochité, Laguna, El Rito (Laguna Colony) and San Felipe.

[1] The Sia, Eleventh Annual Report of the Bureau of Ethnology, Washington, 1894, p. 60.

KIOWAN STOCK.

KIOWA. Indian Territory. (Cat. No. 152908*a*, U.S.N.M.)

Set of four sticks of willow wood, 7 inches in length, $\frac{3}{8}$ inch in width, and $\frac{3}{16}$ inch in thickness (fig. 52), nearly hemispherical in section, with one side flat, and having a deep groove, the stick being doubtless a substitute for the cane, like that used by the Zuñi, as suggested by Mr. Cushing. Three of the grooves are painted red, these sticks having two oblique marks burned across the grooved face near each end. The fourth stick has the groove painted black, with three lines burned across the middle in addition to those at the ends. Its rounded reverse is marked with a star in the center, composed of four crossed lines burned in the wood. The rounded sides of the others are plain. The collector, Mr. James Mooney,[1] prefaces his account of the game with the following song, employed in the Ghost Dance:

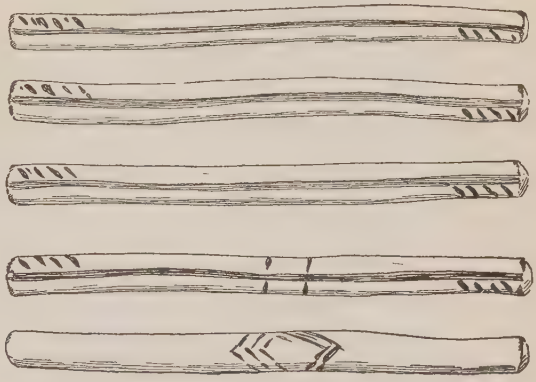


Fig. 52.

SET OF STAVES FOR GAME.

(The lowest stick shows obverse of one above it.)

Length, 5½ inches.

Kiowa Indians, Indian Territory.

Cat. No. 152908*b*, U.S.N.M.

Hisé hi, hisé hi,
Hä' tiné' bäku' tha' na,
Hä' tiné' baku' tha' na,
Häti' ta-u' seta' na,
Häti' ta-u' seta' na.

TRANSLATION.

My comrade, my comrade,
Let us play the awl game,
Let us play the awl game,
Let us play the dice game,
Let us play the dice game.

The woman who composed this song tells how, on waking up in the spirit world, she met there a party of her former girl companions and sat down with them to play the two games universally popular with the prairie tribes.

The first is called *nĕ' bäku' thana* by the Arapaho and *tsoñä* or "awl game" (from *tsoñ*, an awl) by the Kiowa, on account of an awl, the Indian woman's substitute for a needle, being used to keep record of the score. The game is becoming obsolete in the north, but is the everyday summer amusement of the women among the Kiowa, Comanche, and Apache in the southern plains. It is very amusing on account of the unforeseen "rivers" and "whips" that are constantly turning up to disappoint the expectant winner, and a party of women will frequently sit around the blanket for half a day at a time, with a constant ripple of laughter and good-humored jokes as they follow the chances of the play. It would make a very pretty picnic game, or could be readily adapted to the parlor of civilization.

The players sit on the ground around a blanket marked in charcoal with lines and dots and quadrants in the corners, as shown in fig. 6. In the center is a stone upon which the sticks are thrown. Each dot, excepting those between the parallels,

[1] The Ghost Dance Religion, Fourteenth Annual Report of the Bureau of Ethnology, Washington, 1896, II, p. 1002.

counts a point, making twenty-four points for dots. Each of the parallel lines and each end of the curved lines at the corners also counts a point, making sixteen points for the lines, or forty points in all. The players start at the bottom, opposing players moving in opposite directions, and with each throw of the sticks the thrower moves an awl forward and sticks it into the blanket at the dot or line to which her throw carries her. The parallels on each of the four sides are called "rivers," and the dots within these parallels do not count in the game. The rivers at the top and bottom are "dangerous" and can not be crossed, and when the player is so unlucky as to score a throw which brings her to the edge of the river (i. e., upon the first line of either of these pairs of parallels) she "falls into the river" and must lose all she has hitherto gained, and begin again at the start. In the same way, when a player moving around in one direction makes a throw which

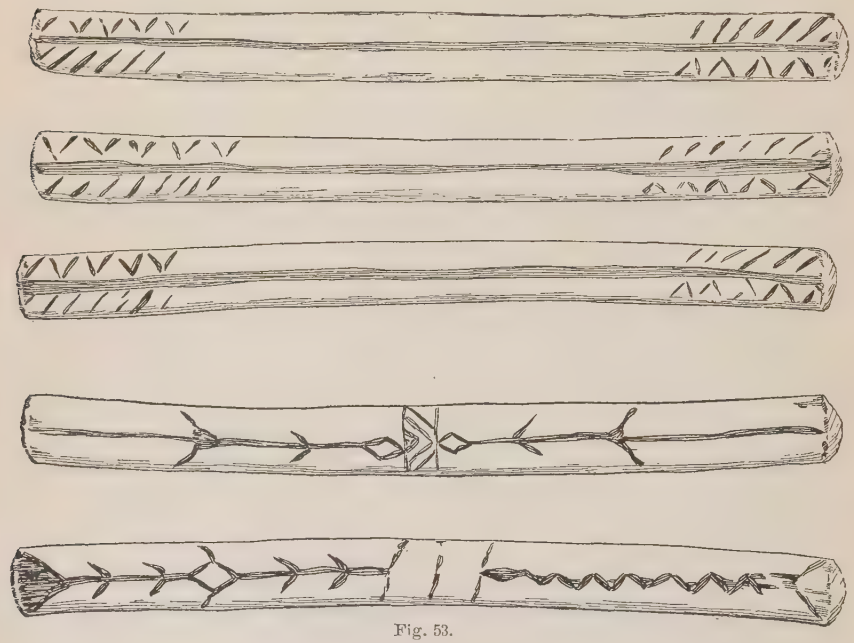


Fig. 53.

SET OF STAVES FOR GAME.

Length, 8¾ inches.

Kiowa Indians, Indian Territory.

Cat. No. 152908*d*, U.S.N.M.

brings her awl to the place occupied by the awl of her opponent coming around from the other side, the said opponent is "whipped back" to the starting point and must begin all over again. Thus there is a constant succession of unforeseen accidents, which furnish endless amusement to the players.

The game is played with four sticks, each from 6 to 10 inches long, flat on one side and round on the other. One of these is the trump stick, and is marked in a distinctive manner in the center on both sides, and is also distinguished by having a green line along the flat side, while the others have each a red line. The Kiowa call the trump stick *sahe*, "green," on account of the green stripe, while the others are called *guadal*, "red." There are also a number of small green sticks, about the size of lead pencils, for keeping tally. Each player in turn takes up the four sticks together in her hand and throws them down on end upon the stone in the center. The number of points depends upon the number of flat or round sides which turn

up. A lucky throw with a green, or trump, stick generally gives the thrower another trial in addition. The formula is:

1 flat side up	= 1.
1 flat side up (if *sahe*)	= 1 and another throw.
2 flat sides up (with or without *sahe*)	= 2.
3 flat sides up	= 3.
3 flat sides up (including *sahe*)	= 3 and another throw.
All 4 flat sides up	= 6 and another throw.
All 4 round sides up	= 10 and another throw.

KIOWA. Indian Territory. (Cat. No. 152908*b*, U.S.N.M.)

Set of four sticks of a variety of alder, 5½ inches in length, $\frac{7}{16}$ inch in width, and ¼ inch in thickness. Three with groove painted red, on flat side, and one with groove painted black. The former are burned with four diagonal marks resembling the feathering of an arrow on

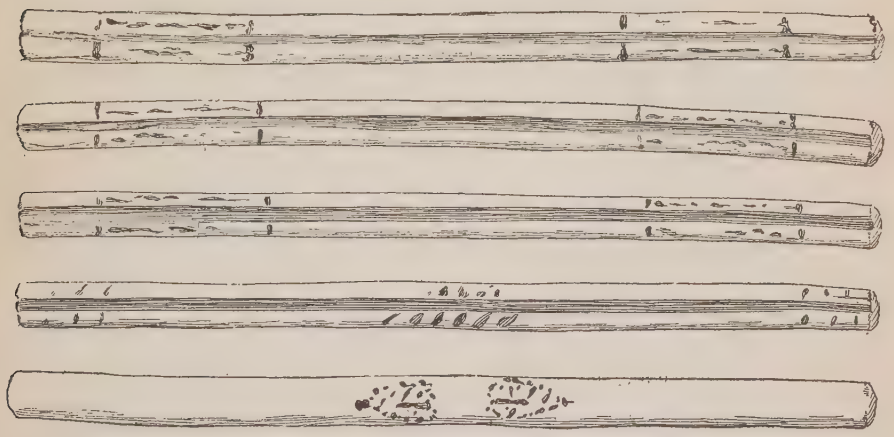


Fig. 54.

STAVES FOR GAME.

Length, 8⅞ inches.

Kiowa Indians, Indian Territory.

Cat. No. 152908*c*, U.S.N.M.

alternate sides of the groove near each end. The fourth stick has in addition two parallel marks burned directly across the middle. Its rounded reverse is burned with a design in the shape of a diamond. The reverses of the others are plain.

KIOWA. Indian Territory. (Cat. No. 152908*d*, U.S.N.M.)

Set of four sticks of willow wood or chestnut sprout, 8¾ inches in length, ¾ inch in breadth, and $\frac{5}{16}$ inch in thickness (fig. 53). Three have flat sides with lengthwise groove painted red, with parallel oblique lines like arrow feathering burned on alternate sides of the groove at the ends, opposite to which are similar marks arranged in triangles. The rounded reverses of these sticks are plain. The fourth stick has an incised device painted black and resembling two feathered arrows, the heads of which meet a transverse band cut across the middle.

Its rounded side has three parallel lines burned across the center, on one side of which is an incised design resembling a serpent, and on the other an undetermined figure.

KIOWA. Indian Territory. (Cat. No. 152908*c*, U.S.N.M.)

Set of four sticks of elm wood, $8\frac{7}{8}$ inches in length, $\frac{9}{16}$ inch in width, and $\frac{5}{16}$ inch in thickness (fig. 54). Three with groove painted red and one with groove painted black. Former burned with two sets of two parallel marks about $1\frac{7}{8}$ inches apart across the grooved face near each end. The fourth stick has in addition oblique marks burned across the center of the same side, with two pyramidal dotted designs in the center of the opposite rounded side, which on the others is plain.

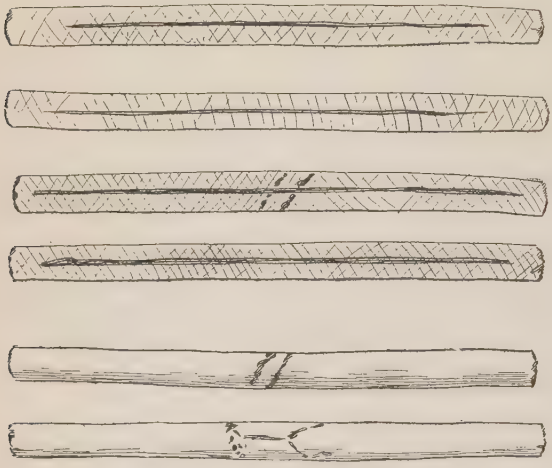


Fig. 55.

SET OF STAVES FOR GAME.

(The two lower sticks represent the obverses of those directly above.)

Length, $5\frac{1}{2}$ inches.

Kiowa Indians, Indian Territory.

Cat. No. 152909*a*, U.S.N.M.

KIOWA. Indian Territory. (Cat. No. 152909*a*, U.S.N.M.)

Set of four sticks, $5\frac{1}{2}$ inches in length, $\frac{7}{16}$ inch in breadth, and $\frac{3}{16}$ inch in thickness (fig. 55). Section ellipsoidal. One side, slightly flatter than the other, is grooved and marked with fine cross lines, forming a lozenge pattern. Three are painted red and one dark green. One of the red sticks is burned in the center, with two parallel marks obliquely across both the grooved and opposite side. The green stick has an undetermined figure burned in the center of the rounded side, which on the other two is plain.

KIOWA. Indian Territory. (Cat. No. 152909*b*, U.S.N.M.)

Set of four sticks, $3\frac{3}{4}$ inches in length, $\frac{5}{16}$ inch in breadth, and $\frac{1}{8}$ inch in thickness. Flat sides grooved and painted, three red and one black. One of the red has an oblique incised line cut across the middle, and two parallel lines on the opposite, rounded side. The black stick has a small triangle cut lengthwise in the center of the rounded side, across which is a transverse incised line.

KIOWA. Indian Territory. (Cat. No. 152909*c*, U.S.N.M.)

Set of four sticks, $5\frac{3}{8}$ inches in length, $\frac{5}{16}$ inch in breadth, and $\frac{1}{8}$ inch in

IVORY AND WOODEN DICE.

Tlingit Indians, Alaska.

Cat. Nos. E 894, 650, 1859, 650, 1557, American Museum of Natural History, New York.

thickness. The flat sides are grooved and have triangular expansions of the groove at each end. Three are painted red and one black. One of the red sticks is marked like the one in the preceding, and the black stick in the same manner.

These Kiowa sticks were all collected by Mr. James Mooney. In each set there is an odd stick, regarded by the author as corresponding with the *atlate*.

KOLUSCHAN STOCK.

TLINGIT. Alaska. (Amer. Mus. Nat. Hist., New York.)

Small ivory die (Cat. No. E. 650) (Plate 7), shaped like a chair, height

Fig. 56.

LEATHER TABLET ON WHICH DICE ARE THROWN.

Height, 7¾ inches.

Tlingit Indians, Alaska.

Cat. No. E. 606, American Museum of Natural History.

1 inch, $\frac{12}{16}$ inch wide at back, and $\frac{10}{16}$ inch at side, with vertical hole from top to bottom filled with lead. It is called *kēt-chü*. From Shakan.

Small wooden die (Cat. No. E. 650) (Plate 7), like preceding. Sides engraved with crossed lines. Back has four lead plugs, and a hole for similar plug. Front has incised rectangular design with three lead plugs.

Small ivory die (Cat. No. E. 894) (Plate 7), like preceding. Height 1 inch, $\frac{12}{16}$ inch wide at back, and $\frac{8}{16}$ inch at side. Front face has small plug of lead.

Small wooden die (Cat. No. E. 1557) (Plate 7), like preceding, $1\frac{1}{2}$ inches high, $\frac{12}{16}$ inch wide at back and sides. Back and three sides marked with incised lines.

Small wooden die (Cat. No. E. 1859) (Plate 7), like preceding, $\frac{15}{16}$ inch high and $\frac{9}{16}$ inch wide at side. Perfectly plain.

From Sitka. Designated as woman's gambling die.

All the above were collected by Lieutenant Emmons.

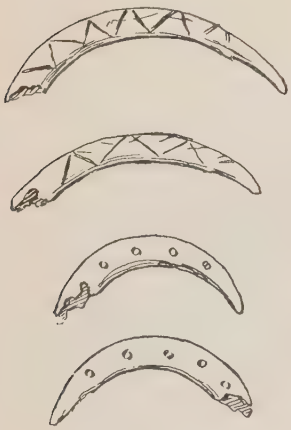


Fig. 57.
SET OF WOODCHUCK TEETH DICE.
Length, $1\frac{1}{4}$ to $1\frac{3}{4}$ inches.
Klamath Indians, Oregon.
Cat. No. 24126, U.S.N.M.

Dr. Boas informs me that one die is used. The counts are: Either side up = 0; back or front up = 1; bottom up = 2. The dice are thrown upon a thick tablet of leather cut with a totemic device, about 8 inches square. One (Cat. No. E. 606, fig. 56) has the device of a bear's head. Another (Cat. No. E. 1057) a beaver, and still another (Cat. No. E. 2404) an unidentified animal. Similar dice are used by the Kwakiutl. (See p. 716.)

LUTUAMIAN STOCK.

KLAMATH. Oregon. (Cat. No. 24126, U.S.N.M.)

Four woodchuck teeth dice (fig. 57). Two, both lefts, stopped at the end with red cloth, and marked on the flat side with chevron pattern, and two, somewhat smaller, one right and the other left, apparently from the same animal, marked on the same side with five small holes. Collected by L. S. Dyer, Indian Agent.

The game is described by Dr. Albert S. Gatschet,[1] under the name of *Skúshash.*

The four teeth of the beaver are marked for this game by the incision of parallel lines or crosses on one side, and a small piece of woolen or other cloth is inserted into the hollow to prevent breaks in falling. The two longer or upper teeth of the beaver are called the *male* (lakí), the pair of lower and shorter the *female* teeth (gúlo) kúlu; distributive form: kúkalu. The marked side of the teeth wins, if it is turned up after dropping. The teeth of the woodchuck (mú-i, moi) serve for the same purpose.

A further account of the game is found in the text translated by Dr. Gatschet:

The Klamath Lake females play a game with beavers' teeth, letting them drop on a rubbing stone. When all the teeth fall with the marked side uppermost, they win two checks. If both female teeth fall right (marked) side up, they win one check. If both male teeth fall right side up, they win one check. Falling

[1] The Klamath Indians, Contributions to North American Ethnology, Washington, 1890, II, Pt. 1, p. 81.

unequally, they win nothing. They quit when one side has won all the stakes. In this game of beavers' teeth (*púman tút*) or woodchucks' teeth (*múyam tút*) they use twelve check sticks to count their gains with. The game is played by two persons, or by two partners on each side. Women only play this game.

The beaver teeth game may be regarded as a modification of the bone game, played by the Blackfeet. The four beaver teeth marked with circles or dots and lines arranged in chevrons clearly replace the four similarly marked staves. Again the tooth tied with sinew (see account by Mr. Eells, p. 747) corresponds with the sinew wrapped stave. The counters, 2, agree with those of the Blackfeet.

MARIPOSAN STOCK.

YOKUT. Fort Tejon and Tule River, California. (Cat. No. 19695, U.S.N.M.)

Set of eight dice (fig. 58), made of canyon walnut shells split in the middle, and each half bowl filled with pitch and powdered charcoal

Fig. 58.
SET OF WALNUT SHELL DICE.
Diameter, 1 inch.
Yokut Indians, California.
Cat. No. 19695, U.S.N.M.

inlaid with small red and white glass beads and bits of abalone shell. Collected by Stephen Powers.

The game is thus described by the collector:[1]

The Yokuts have a sort of gambling which pertains exclusively to women. It is a kind of dice throwing and is called *u-chu'-us*. For a dice they take half of a large acorn or walnut shell, fill it level with pitch and pounded charcoal, and inlay it with bits of bright-colored abalone shells. For a dice-table they weave a very large, fine basket-tray, almost flat, and ornamented with devices woven in black or brown, mostly rude imitations of trees and geometrical figures. Four squaws sit around it to play, and a fifth keeps tally with fifteen sticks. There are eight dice, and they scoop them up in their hands and dash them into the basket, counting one when two or five flat surfaces turn up. The rapidity with which the game goes forward is wonderful, and the players seem totally oblivious to all things in the world beside. After each throw that a player makes she exclaims, *yet' ni* (equivalent to one-y), or *wi-a-tak*, or *ko-mai-éh*, which are simply a kind of sing-song or chanting.

[1] Stephen Powers, Tribes of California, Contributions to North American Ethnology, III, p. 377, Washington, 1877.

NATCHESAN STOCK.

NATCHEZ. Louisiana.

Le Page du Pratz[1] says, referring to the women's game of the Natchez:

> These pieces with which they play are three little bits of cane from 8 to 9 inches long, split in two equal parts and pointed at the ends. Each piece is distinguished by the designs which are engraved on the convex side. They play three at a time and each woman has her piece. To play this game they hold two of these pieces of cane on the open left hand, and the third in the right hand, the round side uppermost, with which they strike upon the others, taking care to only touch the end. The three pieces fall, and when there are two of them which have the convex side uppermost, the player marks one point. If there is only one, she marks nothing. After the first, the two others play in their turn.

PIMAN STOCK.

PAPAGO. Pima County, Arizona. (Cat. No. 174516, U.S.N.M.)

Set of four sticks of sehuara cactus, about 9¼ inches in length, ¾ inch in width and ¼ inch thick (fig. 59). Section ellipsoidal. Painted solid

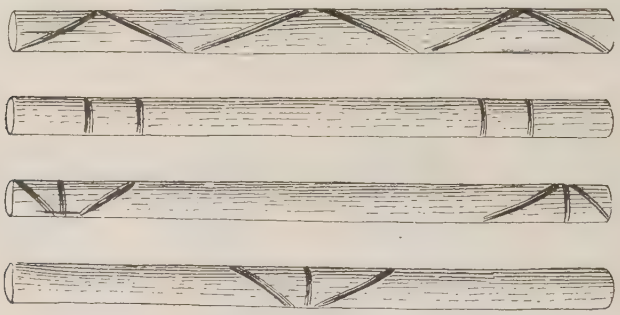


Fig 59.

SET OF STAVES FOR GHING-SKOOT.

Length, 9¼ inches.

Papago Indians, Pima County, Arizona.

Cat. No. 174516, U.S.N.M.

red on one side, "which is flat and marked with black lines of numerical and sex significance." Collected by Mr. W J McGee and Mr. William Dinwiddie.

The game is described by the collectors under the name of *Ghing-skoot*. The four marked faces receive the following names:

(*a*) "Old man."
(*c*) "Young man."
(*b*) "Old woman."
(*d*) "Young woman."

In the play the sticks are held vertically, bunched in the right hand, and struck from underneath on their lower ends by a stone grasped in the left hand, the blow shooting them vertically into the air (Plate 8).

[1] Histoire de la Louisiane, Paris, 1768, III, p. 4.

PAPAGO INDIAN STRIKING STAVES IN THE AIR IN PLAYING GHING-SKOOT.
From a photograph by William Dinwiddie.

When 2 backs and 2 fronts of any sticks come up it equals 2.
When 3 fronts and 1 back of any sticks come up it equals 3.
When 3 backs and the "Young Man" come up it counts 4.
All fronts up count 5.[1]
When 3 backs and the "Old Woman" come up it counts 6.
All backs count 10.
When 3 backs and the "Young Woman" come up it counts 14.
When 3 backs and the "Old Man" come up it counts 15.
If the sticks touch or fall on one another the throw must be repeated.

The counts are kept upon a rectangle marked on the ground (fig. 60), usually approximating 12 by 8 feet, having ten holes or pockets, counting the corners each time, along each side. At two alternate corners are two quadrants called "houses" (*kee*) of five holes each, not counting the corner holes, called "doors" (*jou-ta*).

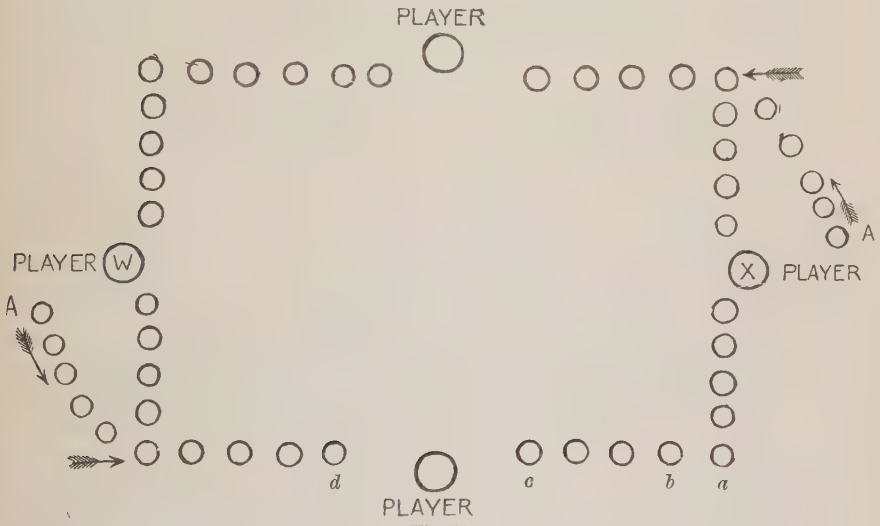


Fig. 60.

CIRCUIT FOR PAPAGO STAVE GAME.

McGee and Dinwiddie.

The game is played by two, three, or four players for self or partners, with counters called "horses." These usually number two for each player. They are put into play consecutively and by alternate throws of the players. A throw of less than five, which does not carry the horses out of the door (two), prevents a player from entering another horse until his aggregate throws are 5+, thus putting his horse into the rectangle proper. After all the horses of a single contestant are in play, he may move the same horse continuously. In counting the pockets, from "A" to either of the nearest corners, is 15. It is optional with the player whether he turns to the left or right upon leaving the door, though he must move his horse around the rectangle in the same

[1] At this play they all laugh, and say the player "has not done skinning himself."

direction after once starting. If "X" throw 15, moving to "*a*," and "W" throws the same number, enabling him to move to the same point, he "kills" or throws "X's" horse out of play, and he must start his piece over again; and again, if he should throw 14, he accomplishes the same result (there is no "one" in the stick count). However, if "X" should get to "*c*" and "W" throw 10 from "house," and get to "*d*," he does not kill him. If on the next throw "W" throws 14 and "X" has not moved from "*c*" he kills him.

A horse must run entirely around the rectangle and back into the house pockets, where he is safe from being "killed;" but to make him a winning piece, the exact number to count to "*a*" must be thrown by the sticks. When a horse is upon a pocket adjoining "*a*," a two throw

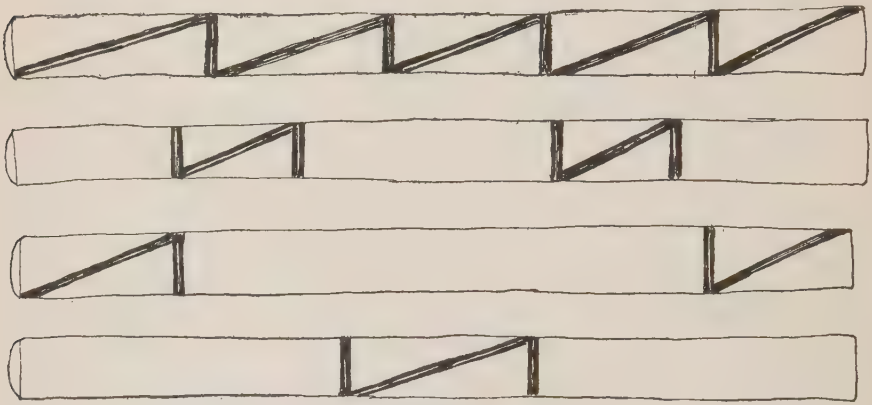


Fig. 61.
SET OF STAVES FOR GAME.
Length, 9 inches.
Pima Indians, Arizona.
Cat. No. 27842, U.S.N.M.

is considered out. The object of the game is to carry all the horses around the pockets and out again at "*a*," the first player succeeding in this being declared the winner.

PIMA. Arizona. (Cat. No. 27842, U.S.N.M.)

Set of four sticks of willow[1] wood, 9 inches in length, $\frac{3}{4}$ inch in breadth, and $\frac{1}{4}$ inch in thickness (fig. 61). Flat on one side, which is incised with transverse and diagonal lines filled in with black paint; opposite, rounded and painted red. Collected by Mrs. G. Stout.

PIMA. Arizona. (Cat. No. 27843, U.S.N.M.)

Set of four sticks of willow[1] wood, $8\frac{3}{8}$ inches in length, $\frac{3}{4}$ inch in breadth, and $\frac{1}{4}$ inch in thickness (fig. 62). Identical with preceding, except in the arrangement of the incised lines. Collected by Mrs. G. Stout.

[1] *Salix amygdaloides*.

PIMA. Arizona. (Cat. No. 76017, U.S.N.M.)

Set of four sticks of hazel wood, $7\frac{1}{4}$ inches in length, $\frac{1}{2}$ inch in breadth,

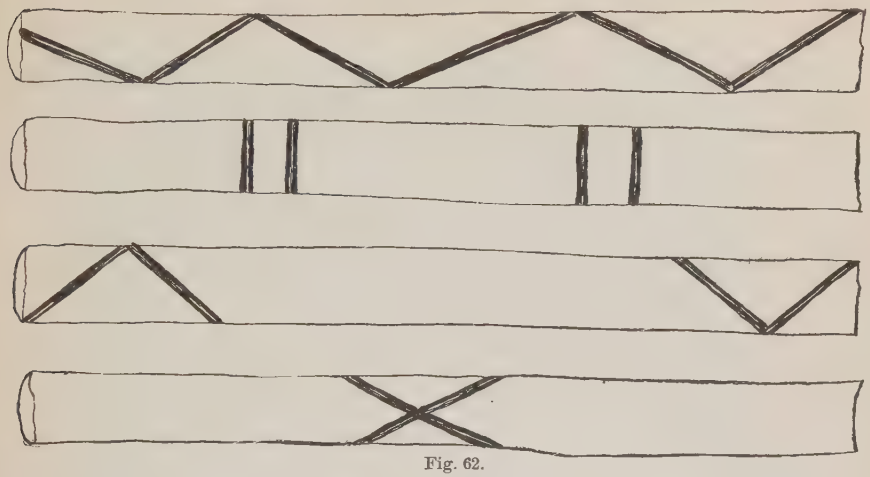


Fig. 62.

SET OF STAVES FOR GAME.

Length, $8\frac{3}{8}$ inches.

Pima Indians, Arizona.

Cat. No. 20843, U.S.N.M.

and $\frac{1}{4}$ inch in thickness (fig. 63). Flat on one side, and marked with incised lines cut at angles across the sticks. These lines are painted

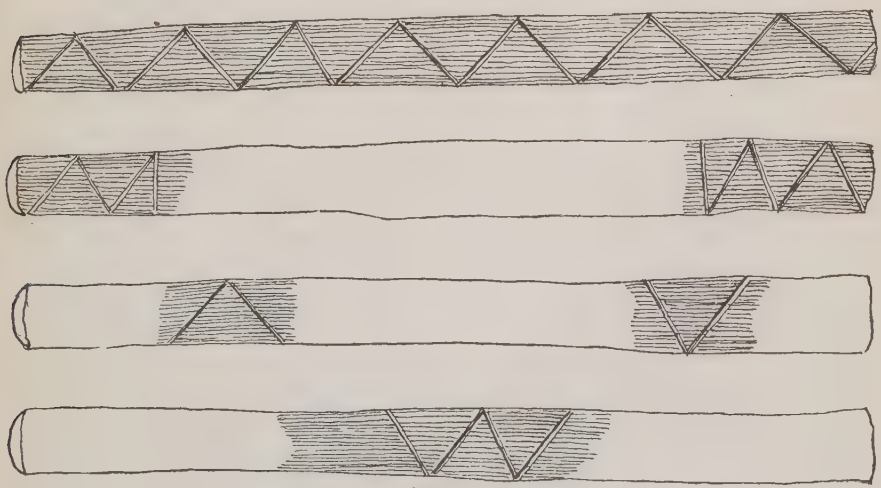


Fig. 63.

SET OF STAVES FOR GAME.

Length, $7\frac{1}{4}$ inches.

Pima Indians, Arizona.

Cat. No. 76017, U.S.N.M.

red, and the inscribed faces painted black. Opposite, rounded sides, plain. Collected by Mr. Edward Palmer. Described as men's sticks.

Mr. Palmer states:

A space of 10 square feet is inclosed by holes made in the ground (fig. 64). At opposite corners on the outside are two semicircular rows of five holes each. At the beginning a marking stick is put in the center hole A of each semicircle, and the point is to play around the square, and back again to the center hole. Each pair of players moves the pegs in opposite directions, and whenever the count is made that would bring the stick to the hole occupied by that of the antagonist, he is sent back to his original starting place.

The counts are as follows:

4 round sides up = 10.
4 flat sides up = 5.

When only one flat side is up, it counts whatever is marked on it; any three, counts 3, and any two, 2.

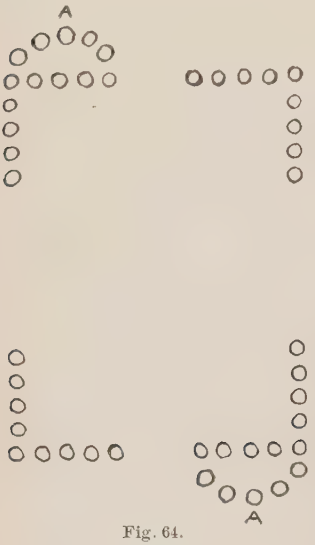


Fig. 64.

CIRCUIT FOR PIMA STAVE GAME.

With Cat. No. 76017, U.S.N.M. Collected by Edward Palmer.

PIMA. Arizona. (Cat. No. 76018, U.S.N.M.)

Set of four sticks, $7\frac{3}{4}$ inches long, $\frac{1}{2}$ inch in breadth, and $\frac{1}{4}$ inch in thickness. Flat on one side and painted black; opposite, rounded and painted red. Collected by Mr. Edward Palmer. Described by the collector as women's sticks. Two play. The sticks are held in the right hand, between the thumb and forefinger, and, with an underthrow, touch the ground slightly, and are let fly.

The counts are as follows:

4 blacks = 2.
4 reds = 1.
2 blacks = out.

TARAHUMARA. Pueblo of Carichic, Chihuahua, Mexico. (Cat. No. $\frac{65}{846}$, Amer. Mus. Nat. Hist., New York.)

Set of four split reeds,[1] 6 inches in length and $\frac{1}{2}$ inch in width, marked on inner, flat sides, as shown in fig. 65. Opposite sides plain. Used in the game of *Ro-ma-la-ka*, or *Quince* (Plate 9). They call the sticks *Ro-ma-la*.

TEPEGUANA. Talayote, near Nabogame, Chihuahua, Mexico. (Cat. No. $\frac{65}{911}$, Amer. Mus. Nat. Hist., New York.)

Set of four ash-wood sticks, $18\frac{1}{2}$ inches in length, $\frac{3}{4}$ inch broad, and $\frac{1}{8}$ inch thick, marked on one side with incised lines smeared with red paint (Plate 10, fig. 1); reverse, plain.

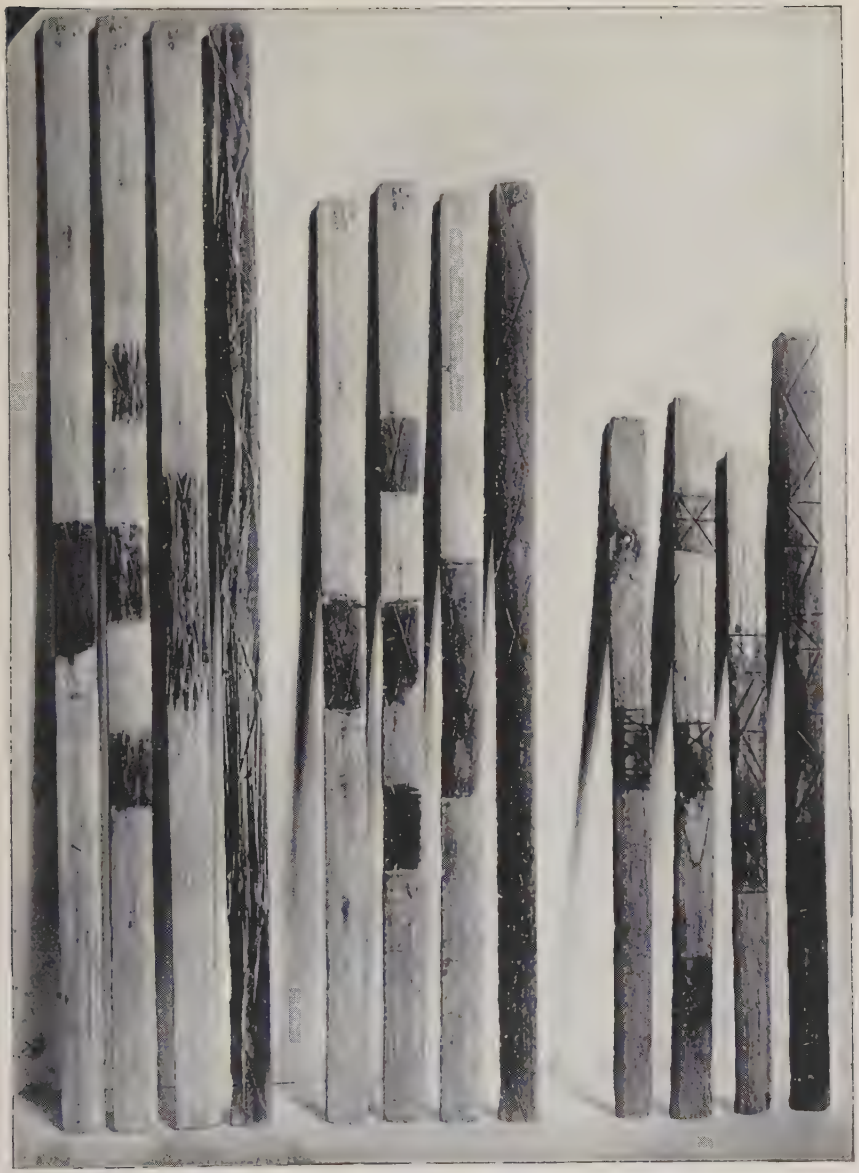
TEPEGUANA. Chihuahua, Mexico. (Cat. No. $\frac{65}{910}$, Amer. Mus. Nat. Hist., New York.)

Set of four ash-wood sticks identical with the preceding, except that they are $16\frac{3}{4}$ inches in length. (Plate 10, fig. 2.)

[1] Called by the natives *tubar*.

TARAHUMARA INDIANS PLAYING "QUINCE" AT THE PUEBLO OF PEÑASCO BLANCO.

From a photograph by Dr. Carl Lumholtz.



a *b* *c*

SETS OF STAVES FOR GAME OF QUINCE.

Lengths: *a*, 18½ inches; *b*, 16¼ inches: *c*, 11¼ to 13¼ inches.

Tepeguana Indians, Chihuahua, Mexico.

Cat. Nos. $\frac{65}{9111}$, $\frac{65}{9100}$, $\frac{65}{16839}$, American Museum of Natural History, New York.

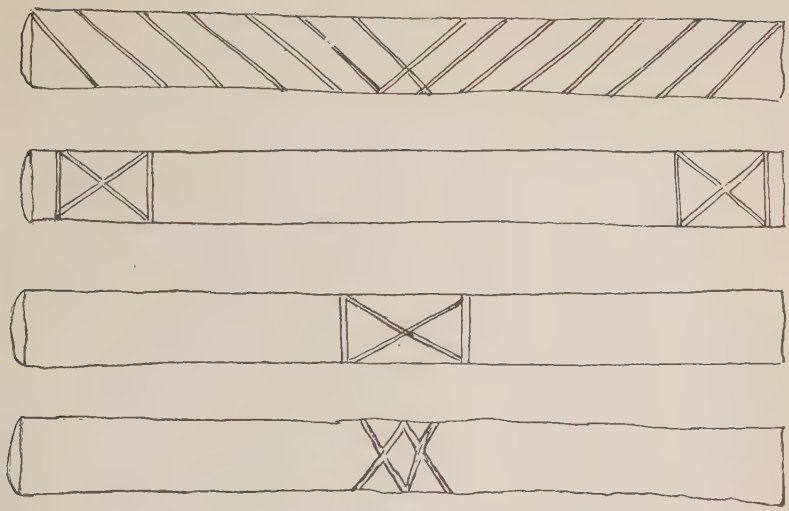


Fig. 65.

SET OF STAVES FOR GAME OF RO-MA-LA-KA.

Length, 6 inches.

Tarahumara Indians, Pueblo of Carichic, Chihuahua, Mexico.

Cat. No. $\frac{65}{846}$, American Museum of Natural History.

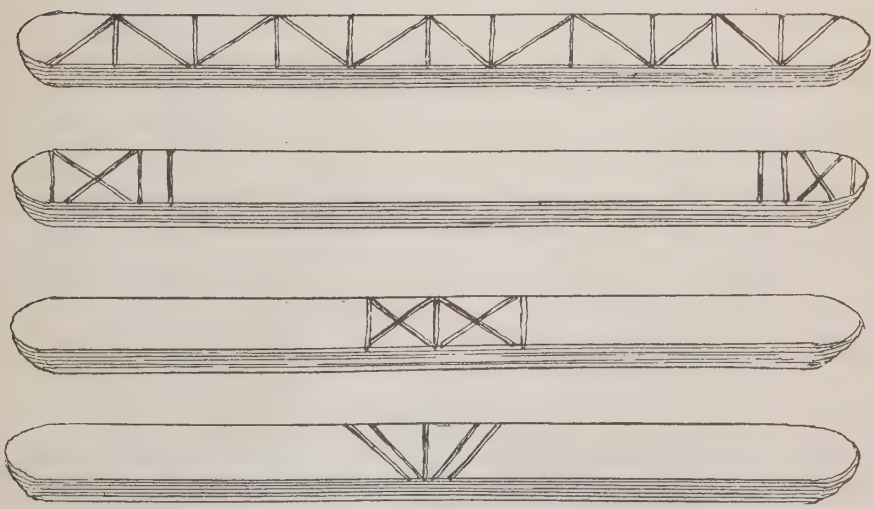


Fig. 66.

SET OF STAVES FOR GAME.

Length, $6\frac{1}{2}$ inches.

Tepeguana Indians, Chihuahua, Mexico.

Cat. No. $\frac{65}{1038}$, American Museum of Natural History.

TEPEGUANA. Chihuahua, Mexico. (Cat. No. $\frac{65}{10639}$, Amer. Mus. Nat. Hist., New York.)

Set of four sticks of canyon walnut or hickory, of slightly different lengths, from $11\frac{1}{4}$ to $13\frac{1}{2}$ inches; $\frac{11}{16}$ inch wide and $\frac{1}{8}$ inch thick. One side flat with incised designs composed of straight and oblique lines, the incised places being stained red (Plate 10, fig. 3); opposite sides rounded and plain.

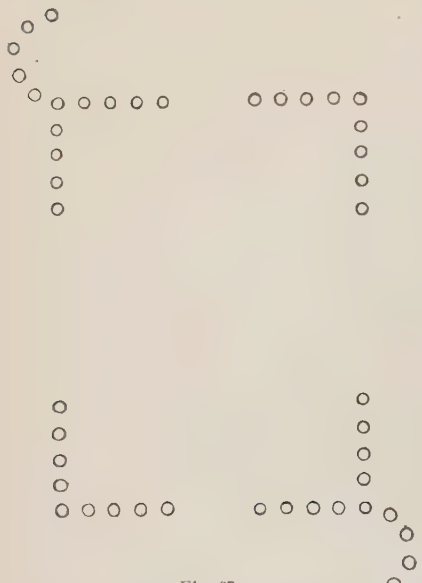


Fig. 67.

CIRCUIT FOR TEPEGUANA AND TARAHUMARA STAVE GAME.

Dr. Carl Lumholtz.

TEPEGUANA. Chihuahua, Mexico. (Cat. No. $\frac{65}{10638}$, Amer. Mus. Nat. Hist., New York.)

Set of four sticks of piñon wood, $6\frac{1}{2}$ inches in length and $\frac{3}{8}$ inch square. These sticks have four instead of two faces. Two opposite sides are flat and unpainted. One set of the other four sides are unpainted, with incised lines filled with red paint, as shown in fig. 66. The sides opposite to these are slightly rounded and painted red. The top stick is marked with a diagonal line across the middle, the next with two straight transverse lines near each end, the third is plain, and the fourth has a single transverse cut across the middle.

The preceding Tarahumara and Tepeguana specimens were all collected by Dr. Carl Lumholtz. He informs me that the Tepeguana call the game *In-tú-ri-ga-i | zú-li | ga-i-rá-ga-i*, "game straight throwing." It is also generally known by the Spanish name of *Quince*,[1] or "Fifteen."

He states that it is played by all the tribes in Chihuahua who live in or near the Sierra, and by the Mexicans as well, but is not seen south of the State of Durango. It is not known to the Cora or Huichole in the State of Jalisco, or to the Tarasco of Michoacan.[2]

[1] Also in French, *Quinze*, "a popular game with cards, in which the object is to make fifteen points." The name *Quince* does not appear to be confined among the Indians to the game played with staves. Mr. Edward Palmer describes the following game under the name of *Quins* (*quince*?) among the Pima of Arizona: "Any number can play. A short, split stick is first thrown in a slanting direction, and each one pitches his arrow to see who can come nearest to it. The one who does so holds the stick up while the others pitch. If the arrow touches the split stick and does not catch, the thrower loses nothing. If, however, the arrow remains in the split stick it becomes the property of the holder. The game ends when one has all the arrows or they tire out."

[2] Mr. C. V. Hartman, who accompanied Dr. Lumholtz, informs me that *Quince* is played with four flattened reeds by the Zaque Indians of the Rio Fuerte in Sinaloa. They call the game in their language *ké-zu-te*.

Dr. Lumholtz informs me that *Quince* is played by throwing the four staves against a flat stone, the counts being kept around a diagram (fig. 67), which consists of holes pecked in the rock, about 3 by 4 feet.

PUJUNAN STOCK.

NISHINAM. California. Powers[1] gives the following account:

The *ha* is a game of dice, played by men or women, two, three, or four together. The dice, four in number, consist of two acorns split lengthwise into halves, with the outsides scraped and painted red or black. They are shaken in the hands and thrown into a wide, flat basket, woven in ornamental patterns, sometimes worth $25. One paint and three whites, or *vice versa*, score nothing; two of each score one; four alike score four. The thrower keeps on throwing until he makes a blank throw, when another takes the dice. When all the players have stood their turn, the one who has scored most takes the stakes, which in this game are generally small, say a "bit."

SALISHAN STOCK.

CLALLAM. Port Gamble, Washington. (Cat. No. 19653, Field Columbian Museum, Chicago.)

Set of four beaver teeth dice, two with straight lines and two with circles. Collected by Rev. Myron Eells.

Mr. Eells writes:

Precisely the same kind are used by the Twana, Puyallup, Snohomish, Chehalis, and Queniut, in fact by all the tribes on Puget Sound. I have obtained them from the Twana and Queniut.

To this list Mr. Eells has added the Cowlitz, Lummi, Skagit, and Squaxon and the Soke of British Columbia.

SNOHOMISH (?)[2] Tulalip Agency, Washington. (Cat. No. 130990, U.S.N.M.)

Set of four beaver teeth dice (fig. 68). Two, both lefts, stopped at end and marked on flat side with rings and dots, and two, rights and lefts, both apparently from the same animal, with both sides plain. Twenty-eight radial bones of birds,

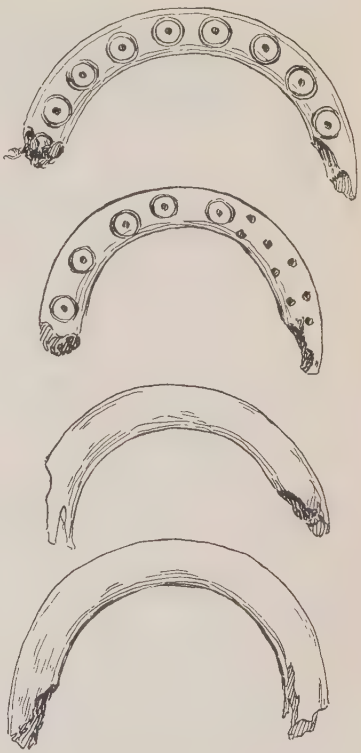


Fig. 68.

BEAVER TEETH DICE.

Length, 1⅞ to 2 inches.

Snohomish (?) Indians, Tulalip Agency, Washington.

Cat. No. 130990, U.S.N.M.

[1] Contributions to North American Ethnology, Washington, 1877, III, p. 332.

[2] It is not possible to determine the tribe exactly. The tribes at the Tulalip Agency are given in Powell's Indian Linguistic Families of North America as follows: Snohomish, 443; Madison, 141; Muckleshoot, 103; Swinomish, 227; Lummi, 295.

about 3 inches in length (fig. 69), used as counters. Collected by Mr. E. C. Cherouse. Designated by the collector as a woman's game.

LKU'ÑGEN (Songish). Vancouver Island, British Columbia.

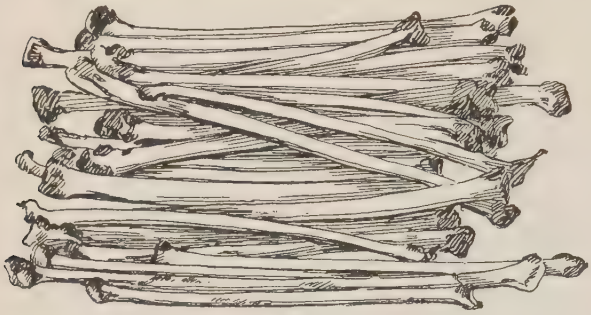


Fig. 69.

GAME COUNTERS. RADIAL BONES OF BIRD.

Length, about 3 inches.

Snohomish (?) Indians, Tulalip Agency, Washington.

Cat. No. 130990, U.S.N.M.

Dr. Franz Boas[1] gives the following account:

Smētalē', a game of dice, is played with four beaver teeth, two being marked on one of their flat sides with two rows of small circles. They are called "women" (*stā'naē smētalē'*). The two others are marked on one of the flat sides with cross lines. They are called "men" (*suwē' k·'a smētalē'*). One of them is tied with a small string in the middle. It is called *iHk·'' ak·'' ē' sen*. The game is played by two persons. According to the value of the stakes, thirty or forty sticks are placed between the players. One begins to throw. When all the marked faces are either up or down he wins two sticks. If the faces of the two "men" are up, of the two "women" down, or *vice versa*, he wins one stick. When the face of the *iHk·' ak·'' ē' sen* is up, all others down, or *vice versa*, he wins four sticks. Whoever wins a stick goes on playing. When one of the players has obtained all the sticks he wins the game.

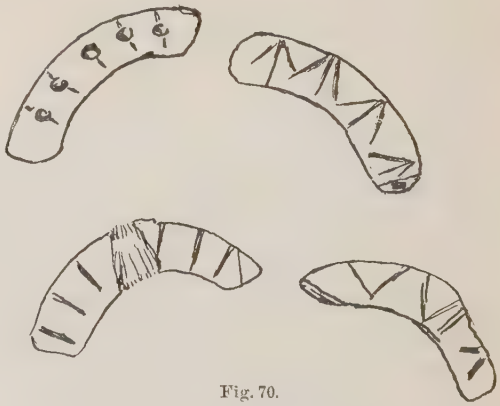


Fig. 70.

SET OF BEAVER TEETH DICE.

Length, 1⅛ inches.

Thompson River Indians, interior of British Columbia.

Cat. No. $\frac{16}{9993}$, American Museum of Natural History.

NISQUALLI. Washington. Mr. George Gibbs[2] states:

The women have a game belonging properly to themselves. It is played with four beaver teeth, *méh-ta-la*, having particular marks on each side. They are thrown as dice, success depending on the arrangement in which they fall.

In his Dictionary of the Nisqualli, the name of the game is given as *mé-ta-la, s'me-ta-la;* the highest or four point of the dice, *kēs*.

[1] Second General Report on the Indians of British Columbia, Report of the Sixtieth meeting of the British Association for the Advancement of Science, Leeds, 1890, London, 1891, p. 571.

[2] Contributions to North American Ethnology, I, p. 206.

NSLAKYAPAMUK (Niakapamux).

Thompson River Indians, interior of British Columbia. (Cat. No. $\frac{16}{9933}$, Amer. Mus. of Nat. Hist., New York.)

Set of four beaver teeth dice (fig. 70); one, partly split, wrapped with sinew. Marked on one face with lines and dots. Opposite sides plain. Collected by Mr. James Teit.

SHOOSHWAP. British Columbia.

Dr. Boas[1] states they play the game of dice with beaver teeth.

TWANA. Washington.

Rev. M. Eells writes:[2]

The dice are made of beavers' teeth generally, but sometimes from muskrats' teeth. There are two pairs of them, and generally two persons play, one on each side, but sometimes there are two or three on each side. The teeth are taken in one hand and thrown after the manner of dice. One has a string around the middle. If this one is down and all the rest are up, or up and the rest down, it counts four; if all are up or down, it counts two; if one pair is up and the other down it counts one; if one pair is up or down and the other divided, unless it be as above, when it counts four, then it counts nothing; 30 is a game, but they generally play three games, and bet more or less, money, dresses, or other things. They sometimes learn very expertly to throw the one with the string on differently from the others, by arranging them in the hand so they can hold this one, which they know by feeling, a trifle longer than the others.

SHAHAPTIAN STOCK.

KLICKITAT. Washington. (Cat. No. 20955, Mus. Arch., Univ. Penn.)

Three beaver teeth dice, two marked with five circles with central dot and one with chevrons on flat side. All have ends wrapped with sinew to prevent splitting. One with circles and one with chevrons wrapped about the middle with sinew. Collected by Mr. A. B. Averill.

SHOSHONEAN STOCK.

COMANCHE. Kiowa Reservation, Indian Territory. (Cat. No. 152911*a*, U.S.N.M.)

Set of six bone dice, having both faces convex, and bearing on one face incised designs (fig. 71) filled with red paint. The reverses are plain, with the exception of the third from the left, which has a cross inscribed upon the back. The device on the face of this die was intended to represent the head of a buffalo, which is more plainly delineated upon one of the Mandan dice (fig. 81). Two of the plum stones in the Sioux game described by Colonel McChesney (p. 760) have a buffalo head on one side, opposite to which is a cross. Collected by Mr. James Mooney, 1891. Described by the collector as played by women, and shaken up in a basket.

COMANCHE. Kiowa Reservation, Indian Territory. (Cat. No. 152911*b*, U.S.N.M.

Set of six bone dice with designs like those on the preceding, but

[1] Second General Report on the Indians of British Columbia, p. 641.

[2] Bulletin, U. S. Geological and Geographical Survey, III, No. 1, p. 89.

painted green instead of red (fig. 72). Collected by Mr. James Mooney, 1891.

PAIUTE. South Utah. (Cat. No. 9411, Peabody Museum.)

Fourteen strips of cane $5\frac{5}{8}$ inches long and in width, with the inner, curved sides painted red (fig. 73). Said to be used upon the dice principle, the red sides only being counted. Collected by Mr. Edward Palmer.

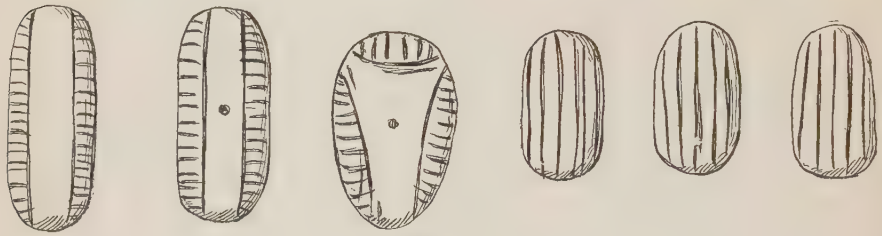


Fig. 71.

SET OF BONE DICE.

Lengths, $1\frac{1}{2}$ to $1\frac{3}{4}$ inches.

Comanche Indians, Indian Territory.

Cat. No. 152911*a*, U.S.N.M.

PAIUTE. Pyramid Lake, Nevada. (Cat. No. 19054, U.S.N.M.)

Set of twelve sticks of grease wood[1] $1\frac{3}{4}$ inches in length, $\frac{5}{16}$ inch in breadth, and $\frac{1}{8}$ inch in thickness (fig. 74). Both sides rounded, the outer painted red and the inner unpainted. Collected by Stephen Powers. Described by the collector as women's gambling sticks.

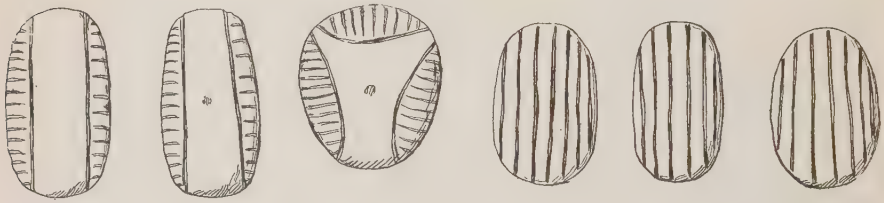


Fig. 72.

SET OF BONE DICE.

Lengths, $1\frac{3}{4}$ and $1\frac{1}{2}$ inches.

Comanche Indians, Indian Territory.

Cat. No. 152911*b*, U.S.N.M.

SHOSHONI. Fort Hall Agency, Idaho. (Cat. No. 22285, U.S.N.M.)

Set of four sticks 10 inches in length, $\frac{7}{16}$ inch in breadth, and $\frac{3}{16}$ inch in thickness; rectangular in section (fig. 75). Made from grooved box boards, which Mr. Cushing pointed out to the writer were used as a substitute for split canes. Burned on inner grooved side with four transverse marks, two near each end. Collected by William H. Danilson.

[1] *Larrea Mexicana.*

BARK TABLETS THROWN AS DICE.

Length, 5 to 10 inches.

Uinkaret Indians, Utah.

Cat. No. 11217, U.S.N.M.

UINKARET.[1] Arizona. (Cat. No. 11217, U.S.N.M.)

Ten flat pieces of cedar bark (Plate 11), rectangular, with rounded corners, from 5 to 10 inches in length and $1\frac{1}{8}$ to $2\frac{1}{4}$ inches in width. Inner,

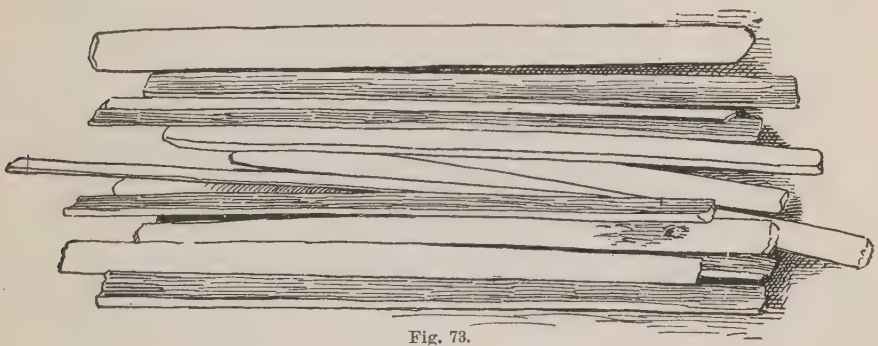


Fig. 73.
GAMING CANES.
Length, $5\frac{5}{8}$ inches.
Paiute Indians, southern Utah.
Cat. No. 9411, Peabody Museum of American Archæology.

smooth sides marked with blotches of red paint; reverse plain. Collected by Maj. J. W. Powell, who has kindly furnished me with the following information concerning them:

They were used as dice, but the method of counting I do not now remember. In fact, there were peculiarities in the count which I never quite mastered, but I remem-

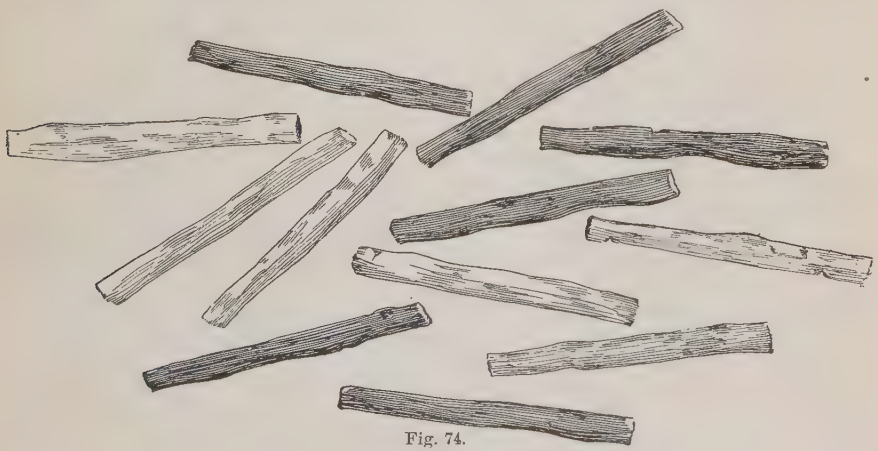


Fig. 74.
SET OF STICKS FOR GAME.
Length, $2\frac{3}{4}$ inches.
Paiute Indians, Nevada.
Cat. No. 19054, U.S.N.M.

[1] Mr. Frederick W. Hodge informs me that the Uinkaret formed a division of the Paiute, and in 1873–74 lived in mountains of the same name in Northern Arizona. "Their population at that time was only 401, and I have no doubt they are officially recognized as Paiute proper. The name means 'Where the pine grows.' Powell is the only one who has mentioned them, as he is practically the only student who has studied this branch of the Shoshonean tribes."

ber that I was satisfied that every piece represented a region. The bark cards were shuffled by tossing them in a little tray basket, or *kaichoats*, sometimes used by the women as caps, but having a more general use as gathering baskets. They were shaken up under the concealment of a blanket and tossed upon another blanket, and different arrangement produced different numbers, which were counted upon little sticks. Each party in the game started with a definite number of these sticks, and the final winner was the one who accumulated all in his pile.

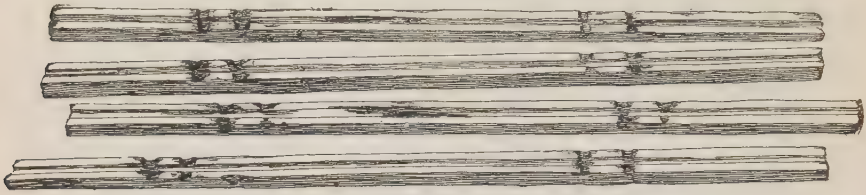


Fig. 75.

SET OF STAVES FOR GAME.

Length, 10 inches.

Shoshoni Indians, Fort Hall Agency, Idaho.

Cat. No. 22285, U.S.N.M.

SIOUAN STOCK.

ASSINABOIN. Dakota. (Cat. No. 8498, U.S.N.M.)

Set of four sticks of polished hickory 15½ inches in length, about 1 inch in breadth in center, tapering to ¾ inch at ends, and ⅛ inch in thickness. Two are burned on one side with war calumets, or tomahawks, and with crosses (stars?) at each end, and two each with four

Fig. 76.

SET OF STAVES FOR GAME.

Length, 15½ inches.

Assinaboin Indians, Dakota.

Cat. No. 8498, U.S.N.M.

bear tracks, with stripes of red paint between (fig. 76). Opposite sides plain. Ends rounded, one notched and tied with sinew to prevent splitting. Collected by Dr. J. P. Kimball.

ASSINABOIN. Upper Missouri.

In a report to Hon. Isaac I. Stevens, Governor of Washington Territory, on the Indian tribes of the Upper Missouri, by Mr. Edwin T.

Denig, a manuscript[1] in the library of the Bureau of American Ethnology, there occurs the following accounts of the bowl and stave game among the Assinaboin:

Most of the leisure time, either by night or by day, among all these nations is devoted to gambling in various ways, and such is their infatuation that it is the cause of much distress and poverty in families. For this reason the name of being a desperate gambler forms a great obstacle in the way of a young man getting a wife. Many quarrels arise among them from this source, and we are well acquainted with an Indian who a few years since killed another because after winning all he had he refused to put up his wife to be played for. Every day and night in the soldier's lodge not occupied by business matters presents gambling in various ways all the time; also in many private lodges the song of hand gambling and the rattle of the bowl dice can be heard.

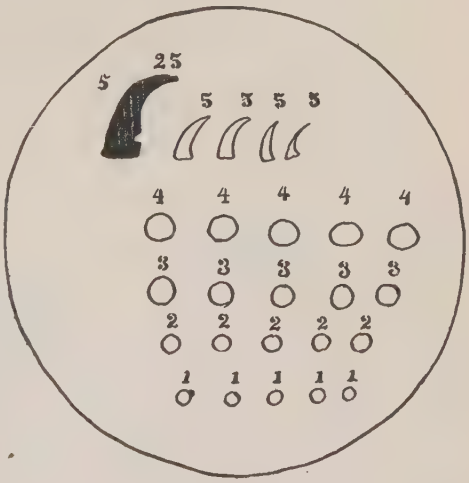


Fig. 77.

ASSINABOIN BOWL GAME.

From a sketch by Edwin T. Denig.

Women are as much addicted to the practice as men, though their games are different, and not being in possession of much property their losses, although considerable to them, are not so distressing. The principal game played by men is that of the bowl, or *cosso-ó*, which is a bowl made of wood with flat bottom 1 foot in diameter or less, the rim turned up about 2 inches, and highly polished inside and out. A drawing and a description of the arithmetical principles of this game is now attached in this place. The manner of counting therein mentioned is the manner in which we learned it from the Indians, but the value of each of the articles composing the dice can be and is changed sometimes in default of some of them being lost, and again by agreement among the players in order to lengthen or shorten the game or facilitate the counting. However, the best and most experienced hands play it as it is represented. It can be played between two or four; that is, either one on each side or two against two. The game has no limit unless it is so agreed in the commencement, but this is seldom done, it being usually understood that the players continue until one party is completely ruined.

The dice and their counts [fig. 77] are as follows:

One large crow's claw, red on one side and black on the other, being the only one that will occasionally stand on end, in which case twenty-five for it is counted, besides its value of five when on its side.

Four small crow's claws, painted the same as the large one, which count five each if the red side turns up; if the black, nothing.

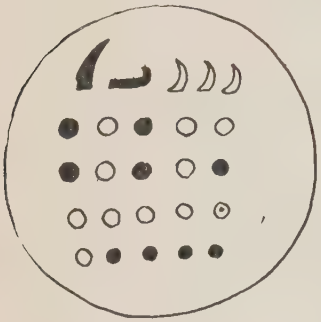
Five plum stones, black on one side and scraped white on the other; the black sides turned up are valued at four each; the white sides nothing.

Five small round pieces of blue china, ½ inch in diameter, which count three each for the blue side; the white side nothing.

[1] Kindly loaned to the writer by the librarian of the Bureau, Mr. Frederick Webb Hodge.

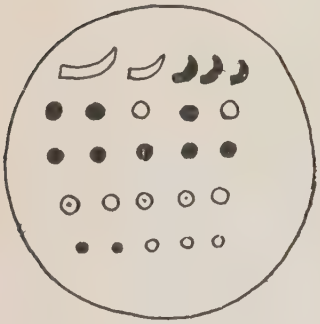
Five vest buttons, the eyes filed off; the eye side turned up counts two each; the smooth side nothing.

Five heads of brass tacks; the concave side turning up counts one each; the convex side nothing.



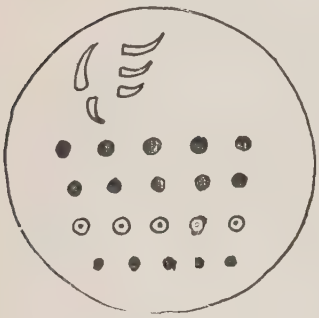
First Throw:

Big claw on end, 30, and 3 red claws, 15	= 45
2 burnt sides up, nothing	= 0
3 blue sides up, 3 each	= 9
1 eye side up, nothing	= 0
4 concaves up, 1 each	= 4
	58



Second Throw:

2 red, none on end, nothing by claws	= 0
3 burnt sides up, 4 each	= 12
5 blue sides up, 3 each	= 15
3 eye sides up, 2 each	= 6
2 concaves, nothing by tacks	= 0
	33



Third Throw:

N. B.—This is the best throw that can be made and takes all the stakes when the game does not exceed 100.

Big claw on end, 30, all the rest red, 20	= 50
5 burnt sides up, 4 each	= 20
5 blue sides up, 3 each	= 15
5 eye sides up, 2 each	= 10
5 concave tacks, 1 each	= 5
	100

Fig. 78.

COUNTS IN ASSINABOIN BOWL GAME.

From a sketch by Edwin T. Denig.

The bowl is held by the tips of the four fingers inside the rim, and the thumb underneath. The dice being put in, they are thrown up a few inches by striking the bottom of the bowl on the ground, so that each counter makes several revolutions. It is altogether a game of chance, and no advantage can be taken by anyone in making the throws. The counters or dice never leave the bowl, but are counted as the value turns up according to the plate inserted in this place describing the same. One person having shaken it and the amount of his throw having been ascertained, a requisite number of small sticks are placed before him, each stick counting one.

In this way the game is kept, but each keeps his adversary's game, not his own; that is, he hands him a number of sticks equal to the amount of his throw, which are laid so that all can see them. Each throws in turn unless the big claw stands on end, in which case the person is entitled to a successive throw. By much practice they are able to count the number turned up at a glance, and the principles of the game being stated on the drawing we will now describe how it is carried on. It has been observed in these pages, in references to their gambling, that it is much fairer in its nature than the same as carried on by the whites, and this is worthy of attention, inasmuch as it shows how the loser is propitiated, so that the game may not result in quarrel or bloodshed, as is often the case. The game is mostly played by the soldiers and warriors, and each must feel equal to the other in courage and resolution; it is often kept up for two or three days and nights without any intermission, except to eat, until one of the parties is ruined.

Example.—A plays against B; each puts up a knife, and they throw alternately until 100 is counted by dice; say A wins. B now puts up his shirt against two knives, which is about equal in value; say A wins again. B then stakes his powderhorn and some arrows against the whole of A's winnings. Should B now win, the game commences again at the beginning, as A would only have lost a knife; but, supposing A wins, B now puts up his bow and quiver of arrows against all A has won. The stakes are never withdrawn but let lie in front of them. Say A again wins. B then stakes his blanket and leggings, which are about equal in value to all A has won, or, if not, it is equalized by adding or subtracting some article. Supposing A again to be winner, he would then be in possession of 2 knives, 1 shirt, 1 blanket, 1 powderhorn, 1 bow and quiver of arrows, and 1 pair leggings, the whole of which the Indians value at 8 robes. B now stakes his gun against all the above of A's winnings; now if A again wins, he only retains the gun, and the whole of the rest of the property won by A returns to B, but he is obliged to stake it all against his gun in possession of A, and play again. If A wins the second time, he retains the whole, and B now puts up his horse against all of A's winnings, including gun. If A wins, he retains only the horse, and the gun and everything else revert again to B, he being obliged to stake them again against the horse in A's possession. If A wins this time, he keeps the whole, but if B wins he only gets back the horse and gun, and all the rest of the property goes to A. Supposing B again loses and continues losing until all his personal property has passed into the hands of A, then B, as a last resort, stakes his wife and lodge against all his property in the hands of A. If A wins, he only keeps the woman; the horse, gun, and all other property returns again to B, with the understanding, however, that he stake it all to get back his wife. Now if B loses, he is ruined, but if A loses he gives up only the woman and the horse, continuing to play with the rest of the articles against the horse until one or the other is broke.

At this stage of the game the excitement is *very* great. The spectators crowd around and intense fierceness prevails. Few words are exchanged, and no remarks made by those looking on. If the loser be completely ruined and a desperate man, it is more than likely he will by quarrel endeavor to repossess himself of some of his property, but they are generally well matched in this respect, though bloody struggles are often the consequence. We have known Indians to lose *everything*, horse, dogs, cooking utensils, lodge, wife, even to his wearing apparel, and be obliged to beg an old skin from someone to cover himself, and seek a shelter in the lodge of one of his relations. It is, however, considered a mark of manliness to suffer no discomposure to be perceptible on account of the loss, but in most cases we imagine this a restraint forced upon the loser by the character of his adversary. Suicide is never committed on these occasions. His vengeance seeks some other outlet—in war expeditions, or some way to acquire property that he may again play and retrieve his losses. There are some who invariably lose and are poor all their lives. A man may with honor stop playing with the loss of his gun. He has, also, a second opportunity to retire on losing his horse, and when this is so understood at the commence-

ment they do; but when a regular set-to takes place between two soldiers, it generally ends as above described.

The usual game which women play alone—that is, without the men—is called *Chunkan-dee,* and is performed with by four sticks marked on one side and blank on the other, as described in the inclosed plate. The women all sit in a circle around the edge of some skin spread upon the ground, each with her stake before her. One of them gathers up the sticks and throws them down forcibly on the end, which makes them bound and whirl around. When they fall the number of the throw is counted, as herein stated. The implements (fig. 79) are four sticks, 12 inches long, flat, and rounded at the ends, about 1 inch broad and $\frac{1}{8}$ thick. Two of them have figures of snakes burned on one side and two the figure of a bear's foot.

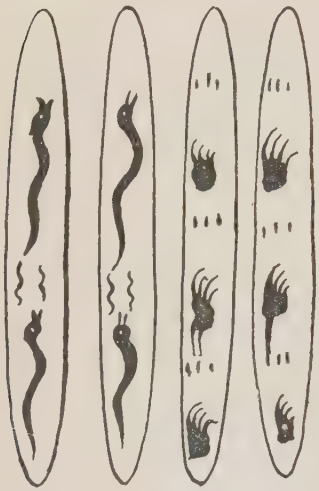


Fig. 79.

SET OF GAMING STICKS.

Length, 12 inches.

Assinaboin Indians, Upper Missouri.

From a sketch by Edwin T. Denig.

All the sticks are white on the opposite side.

2 painted or marked sides and 2 white counts	2
All the white sides turned up counts.	10
3 burnt sides up and 1 white count..	0
(N. B.—Three white sides up and 1 burnt counts nothing.)	
4 burnt sides up counts	10

Each throws in turn against all others, and if the whole of the marked sides or all the fair sides of the sticks are turned up, she is entitled to a successive throw. The game is forty, and they count by small sticks as in the preceding. In fine weather many of these gambling circles can be seen outside their lodges, spending the whole day at it, instead of attending to their household affairs. Some men prohibit their wives from gambling, but these take the advantage of their husbands'

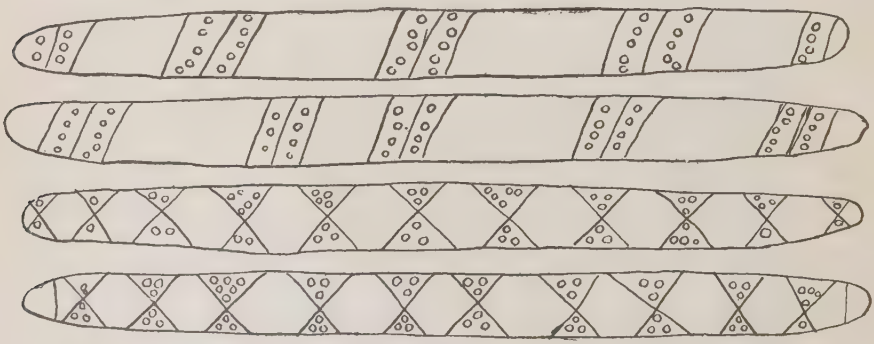


Fig. 80.

SET OF BONE GAMING STAVES.

Length, 8$\frac{1}{2}$ inches.

Gros Ventres Indians, Dakota.

Cat. No. 8425, U.S.N.M.

absence to play. Most of the women will gamble off everything they possess, even to the dresses of their children, and the passion appears to be as deeply rooted in them as in the men. They frequently are thrashed by their husband for their losses and occasionally have quarrels among themselves as to the results of the game.

GROS VENTRES. Dakota. (Cat. No. 8425, U.S.N.M.)

Set of four bone staves made from cores of elk horn, $8\frac{1}{2}$ inches in length, $\frac{11}{16}$ inch in width in middle, and about $\frac{1}{16}$ inch thick. The outer

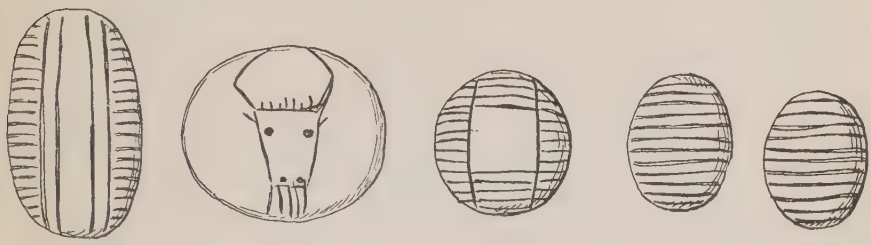


Fig. 81.

SET OF BONE DICE.

Lengths, $1\frac{1}{2}$, $1\frac{5}{16}$, and 1 inch.

Mandan Indians, Fort Berthold, North Dakota.

Cat. No. 8427, U.S.N.M.

rounded face of the bone is marked with lines and dots, filled in with faint red paint, as shown in fig. 80, there being two pairs marked alike. Opposite, unmarked and showing texture of bone. Ends rounded. Collected by Dr. Washington Matthews, U. S. A. Described as

Fig. 82.

BASKET FOR DICE GAME.

Diameter, $7\frac{1}{2}$ inches.

Mandan Indians, Fort Berthold, North Dakota.

Cat. No. 8427, U.S.N.M.

women's gambling instruments. Dr. Matthews states in a private letter to the writer that these bone staves were not thrown so as to rebound, but gently, ends down, on a blanket.

IOWA.

Catlin[1] describes a game among the Iowa under the name of *Kon-thogra* ("Game of Platter").

This is the fascinating game of the women, and exclusively their own, played with a number of little blocks of wood the size of a half-crown piece, marked with certain points for counting the game, to be decided by throws, as they are shaken into a bowl and turned out on a sort of pillow. The bets are made after the bowl is turned, and decided by the number of points and colors turned.

MANDAN. Fort Berthold, North Dakota. (Cat. No. 8427, U.S.N.M.)

Set of five bone dice with incised designs (fig. 81) filled in with red paint, and basket of woven grass (fig. 82) 7½ inches in diameter at top and 3 inches deep. With the dice is a small clay effigy, 1¼ inches in length, with legs outspread, and with arms and head missing (fig. 83). Collected by Dr. Washington Matthews, U. S. A.

Catlin[2] mentions the game of the platter among the Mandan.

OMAHA.

Dr. J. Owen Dorsey[3] gives the following account under the name of "Plum-stone Shooting," ꞑa^{n}/-si kide:[4]

Fig. 83.
CLAY FETICH USED IN DICE GAME.
Length, 1¼ inches.
Mandan Indians, Fort Berthold, North Dakota.
Cat. No. 8427, U.S.N.M.

Five plum-stones are provided, three of which are marked on one side only with a greater or smaller number of black dots or lines and two of them are marked on both sides; they are, however, sometimes made of bone of a rounded or flattened form, somewhat like an orbicular button-mold, the dots in this case being impressed. A wide dish and a certain number of small sticks by way of counters are also provided. Any number of persons may play this game, and agreeably to the number engaged in it is the quantity of sticks or counters. The plum-stones or bones are placed in a dish, and a throw is made by simply jolting the vessel against the ground to make the seeds or bones rebound, and they are counted as they lie when they fall. The party plays around for the first throw. Whoever gains all the sticks in the course of the game wins the stake. The throws succeed each other with so much rapidity that we vainly endeavor to observe their laws of computation, which it was the sole business of an assistant to attend to. The seeds used in this game are called ꞑa^{n}/-si gĕ. Their number varies. Among the Ponka and Omaha only five are used, while the Oto play with six. Sometimes four are marked alike, and the fifth is black or white (unmarked). Generally three are black on one side and white or unmarked on the other, while two have each a star on one side and a moon on the other. The players must always be of the same sex and class; that is, men must play men, youths with youths, and women with women. There must always be an even number of players, not more than two on each side. There are about twenty

[1] Thomas Donaldson, The George Catlin Indian Gallery, Report of the Smithsonian Institution, 1885, p. 152.

[2] Letters and Notes on the Manners, Customs, and Conditions of the North American Indians, London, 1841, I, p. 132.

[3] Omaha Sociology, Third Annual Report of the Bureau of Ethnology, Washington, 1884, p. 334.

[4] Miss Alice C. Fletcher gives me the name of the game as gkon-thi. Gkon is the first syllable of the word gkoñ-de, "plum;" thi means seed. The game is described by Maj. S. H. Long (Account of an Expedition from Pittsburg to the Rocky Mountains, I, p. 215) under the name of *Kon-se-ke-da*.

sticks used as counters. These are made of deska, or of some other grass. The seeds are put in a bowl, which is hit against a pillow and not on the bare ground, lest it should break the bowl. When three seeds show black and two have the moon on the upper side it is a winning throw, but when one is white, one black, the third black (or white), the fourth showing a moon, and the fifth a star, it is a losing throw. The game is played for small stakes, such as rings and necklaces.

Fig. 84 represents a set of plum-stones from the Omaha, collected by Miss Alice C. Fletcher. Two have a star on one side and a crescent moon on the other, the device being in white on a burnt ground, and three white or plain on one side and black on the other. They were accompanied by a hemispherical bowl made of walnut, 12 inches in diameter, of perfect form and finish, and about one hundred slips of the stalks of the blue joint grass, about 12 inches in length, used as counters.

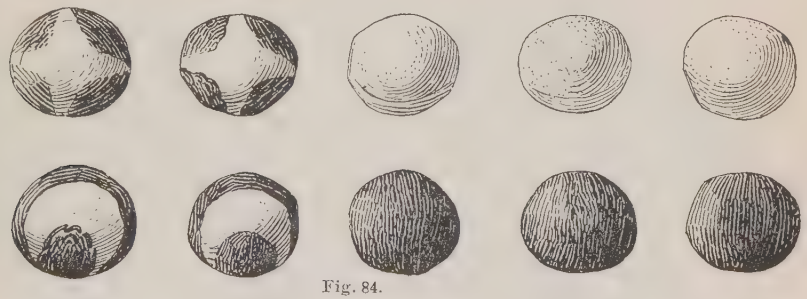


Fig. 84.

SET OF PLUM STONES FOR GAME.

(A, obverse; B, reverse.)

Diameter, ¾ inch.

Omaha Indians.

In the possession of Miss Alice C. Fletcher.

DAKOTA SIOUX. South Dakota. (Cat. No. 153365, U.S.N.M.)

Set of seven plum-stones, plain on one side and with marks burnt upon the other. Collected by Dr. Z. T. Daniel,[1] who describes the game as follows under the name of *Kansu:*

This is a very ancient game of the Sioux Indians, played usually by elderly women, although young women and men of all ages play it. *Kansu* is an abbreviation of *kanta su,* which means plum-seed. They drop the *ta* and call the game *kansu,* because it is played with plum-seeds. It is used for gambling and amusement and is more like our dice than any other of our games. When playing, the seeds are thrown up in a basket or bowl and the markings on the seeds that are up or down decide the throw.

The seeds used are those of the wild plum of the Dakotas and indigenous throughout the northwest region of the United States generally. They are seven in number. On one side they are all perfectly plain and of the natural color, except some fine marks on four to distinguish them when the burnt sides are down, but on the reverse side of all there are burnt markings. These markings are made by a piece of hot iron, such as a nail, the blade of a knife, or a piece of hoop iron. Before the natives used iron they used a hot stone. Six of the seeds are in pairs of three different kinds, and only one is of a different marking from all the others. One pair is

[1] *Kansu,* a Sioux game, The American Anthropologist, V, p. 215.

scorched entirely on one side, another pair has an unburnt line about 2 millimeters wide traversing their longitudinal convexity (the remainder of their surfaces on that side being scorched); the remaining pair have one-half of one side burnt longitudinally, the other half of the same side unburnt, but traversed by three small burnt lines equidistant about 1 millimeter wide running across their short axes. The remaining and only single seed has an hourglass figure burnt on one side, the contraction in the figure corresponding to the long diameter of the seed. They are all of the same size, about 16 millimeters long, 12 wide, and 7 thick, and are oval, having the outlines and convexity on each side of a diminutive turtle shell. When the Sioux first obtained our ordinary playing cards they gave to them, as well as to the game, the name *kansu*, because they were used by the whites and themselves for the same purpose as their original *kansu*. The men do not use the seeds or the original *kansu* now, but they substitute our cards. The women, however, do use the game at the present time. When a ration ticket was issued to them they gave it the name of *kansu*, because it was a card; so also to a postal card, business card, or

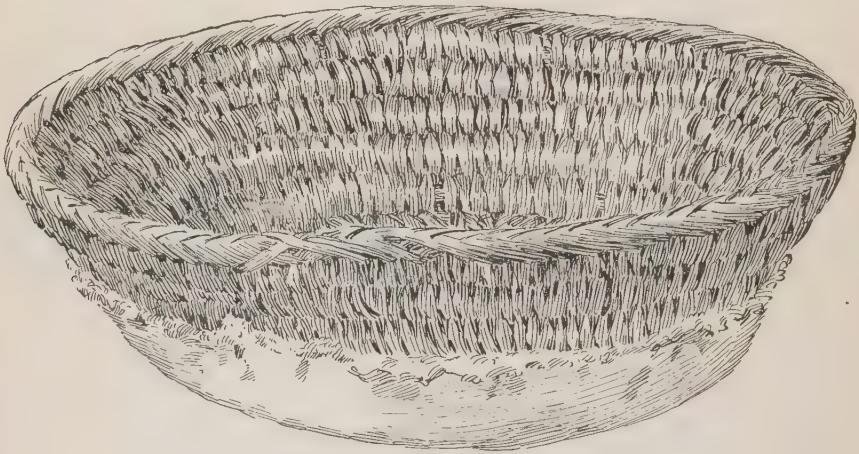


Fig. 85.

BASKET FOR PLUM STONE GAME.

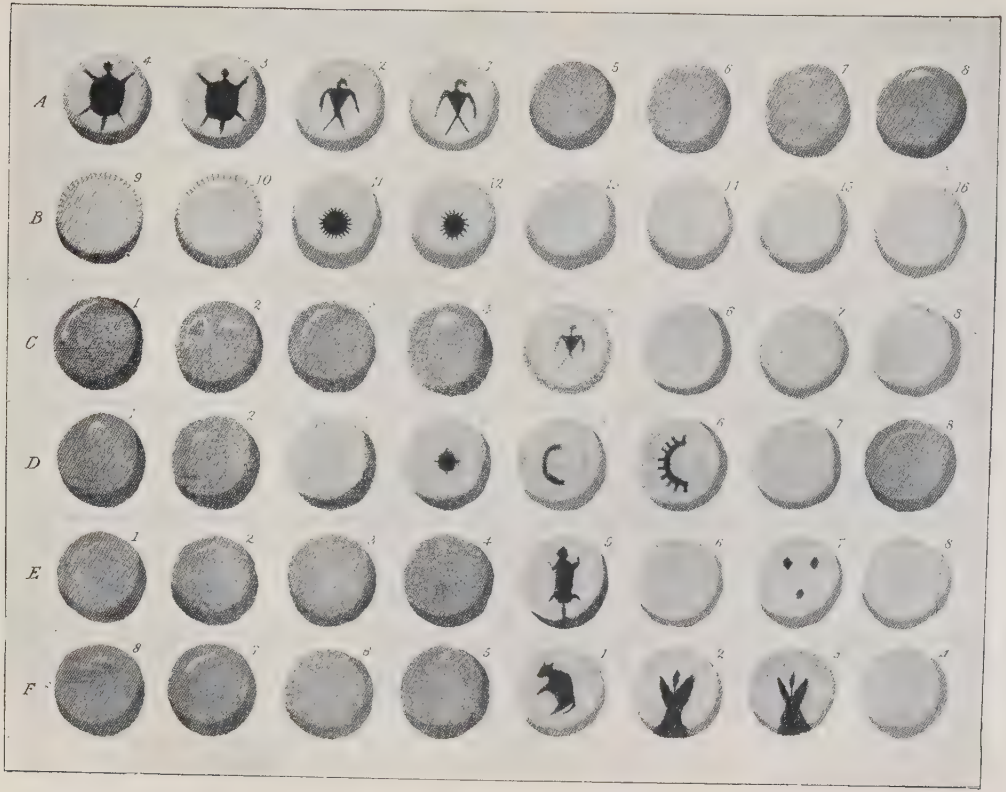
Diameter at top, 8 inches.

Dakota Sioux, South Dakota.

Cat. No. 10443, Museum of Archæology, University of Pennsylvania.

anything of the description of a card or ticket; a railroad, street-car, milk, store, or circus ticket would be called a *kansu*; so that the evolution of this term as applied to a ticket is a little interesting.

The description of the game *kansu*, as related by the Sioux is as follows: Any number of persons may play, and they call the game *kansu kute*, which literally means "to shoot the seeds." When two persons play, or four that are partners, only six of the seeds are used, the hourglass or king *kansu* being eliminated. The king is used when a number over two are playing and each one for himself. The three-line seeds are called "sixes," the one-line "fours," those that are all black "tens." When two play for a wager they each put sixteen small sticks, stones, corn, peas, or what not into a common pile between them, making in all thirty-two. The play begins by putting the seeds into a small bowl or basket and giving it a quick upward motion, which changes the positions of the seeds, then letting them fall back into the receptacle, care being taken not to let any one fall out. The markings that are up decide the throw, precisely on the principle of our dice. As they count, they take from the pile of thirty-two what they make, and when the pile is exhausted the one having the greatest number wins the game. If all the white



CASTS IN SIOUX PLUM STONE GAME.
After Schoolcraft.

sides are up, the throw counts sixteen. The two "tens" up and four whites count sixteen. Two pairs up count six, and the player takes another throw. Two "sixes" down count four. If both "tens" are down, either side symmetrically, it counts ten. If all burnt sides are up, it is sixteen. If both "fours" are down, it is six. If two pairs are up, it counts two. One pair up does not count unless all the others are down. When more than two play, and each for himself, the "king" is introduced. If the king is up and all the others down, the count is sixteen. If they are all up, the count is the same. If two pairs are up, the count is six. If the king is down and the remainder up, the count is sixteen.

(Brule Dakota) Sioux. South Dakota. (Cat. Nos. 10442, 10443, 16552, Mus. Arch., Univ. Penn.)

Plum-stone dice for game (eleven, apparently belonging to two sets). Basket in which dice are thrown, made of woven grass, 8 inches in diameter at top and 2¼ inches deep, with bottom covered with cotton cloth (fig. 85). Set of thirty-two sticks used in counting with above

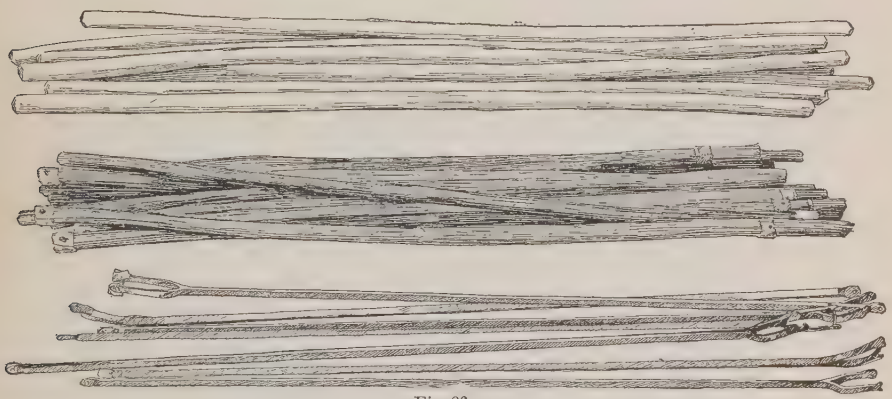


Fig. 86.

COUNTING STICKS FOR PLUM STONE GAME.

Lengths, 13, 12, and 7 inches.

Dakota Sioux, South Dakota.

Cat. No. 16552, Museum of Archæology, University of Pennsylvania.

(fig. 86), consisting of eleven rounded white sticks about 13 inches in length, fourteen similar black sticks (made of ribs of an old umbrella), about 12 inches in length, and seven iron sticks about 11 inches in length (consisting of iron ribs of the umbrella). Collected by Mr. Horatio N. Rust in 1873.

Comparison of the various accounts of the plum stone game as played by the Sioux shows many variations in the markings on the seeds. This is well illustrated in the account given by Schoolcraft,[1] who describes the game among the Dakota tribes under the name of *Kuntah-so*, which he translates as "the game of the plum-stones."

He figures five sets of stones, each consisting of eight pieces.

In set A (Plate 12), Nos. 1 and 2 represent sparrow hawks with forked tails, or the fork-tailed eagle, *Falco furcatus*. This is the so-called war eagle. Nos. 3 and 4 are

[1] Information concerning the History, Condition, and Prospects of the Indian Tribes of the United States, Philadelphia, 1853, II, p. 72.

the turtle, which typifies generally the earth. If 1 and 2 fall upwards, the game is won. If but one of these figures fall upwards and at the same time 3 and 4 are up, the game is also won. The other numbers, 5, 6, 7, and 8 are all blanks. B denotes the reversed sides of A, which are all blanks.

Set C shows different characteristics, with a single chief figure (5), which represents the *Falco furcatus*. This throw indicates half a game, and entitles the thrower to repeat it. If the same figure (5) turns up, the game is won. If no success attends it by throwing up the chief figure, the throw passes to other hands. D is the reverse of C and is a blank throw.

In set E, No. 5 represents a muskrat. The three dots (7) indicates two-thirds of a throw, and the thrower can throw again; but if he gets blank the second time, the dish passes on to the next thrower. Set F is invested with different powers. No. 1 represents a buffalo, and 2 and 3 denote chicken hawks, fluttering horizontally in the air. The chief pieces (5, 6, and 7) have the same powers and modifications as A.

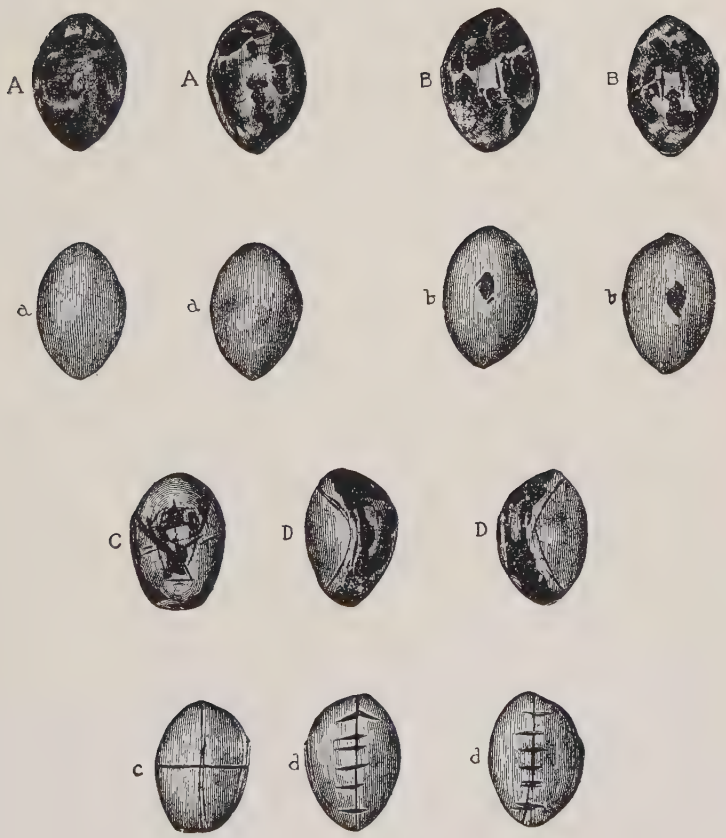
To play this game, a little orifice is made in the ground and a skin put in it. Often it is also played on a robe. The women and young men play this game. The bowl is lifted with one hand about 3 or 4 inches and suddenly pushed down to its place. The plum-stones fly over several times. The stake is first put up by all who wish to play. A dozen can play at once, if it be desirable.

Dr. H. C. Yarrow[1] refers to the plum stone game, in his paper on Indian mortuary customs, as described to him by Dr. Charles E. McChesney, U. S. A., among the Wahpeton and Sisseton (Dakota) Sioux.

After the death of a wealthy Indian the near relatives take charge of the effects, and at a stated time, usually at the time of the first feast held over the bundle containing the lock of hair, they are divided into many small piles, so as to give all the Indians invited to play an opportunity to win something. One Indian is selected to represent the ghost, and he plays against all the others, who are not required to stake anything on the result, but simply invited to take part in the ceremony, which is usually held in the lodge of the dead person, in which is contained the bundle containing the lock of hair. In cases where the ghost himself is not wealthy the stakes are furnished by his rich friends, should he have any. The players are called in one at a time, and play singly against the ghost's representative, the gambling being done in recent years by means of cards. If the invited player succeeds in beating the ghost, he takes one of the piles of goods and passes out, when another is invited to play, etc., until all the piles of goods are won. In cases of men, only the men play, and in cases of women, the women only take part in the ceremony. Before white men came among these Indians and taught them many of his improved vices, this game was played by means of figured plum seeds, the men using eight and the women seven seeds, figured as follows and as shown in plate 13. Two seeds are simply blackened on one side (AA), the reverse (*aa*) containing nothing. Two seeds are black on one side, with a small spot of the color of the seed left in the center (BB), the reverse side (*bb*) having a black spot in the center, the body being plain. Two seeds have a buffalo's head on one side (C) and the reverse (*c*) simply two crossed black lines. There is but one seed of this kind in the set used by women. Two seeds have the half of one side blackened and the rest left plain, so as to represent a half moon (DD); the reverse (*dd*) has a black longitudinal line crossed at right angles by six small ones. There are six throws whereby the player can win, and five that entitle him to another throw. The winning throws are as follows, each winner taking a pile of the ghost's goods:

Two plain ones up, two plain with black spots up, buffalo's head up, and two half moons up wins a pile. Two plain black ones up, two black with natural spot up, two longitudinally crossed ones up, and the transversely crossed one up wins a pile.

[1] Mortuary Customs of the North American Indians, First Annual Report of the Bureau of Ethnology, Washington, 1881, p. 195.



FIGURED PLUM STONES FOR GAMES.

Dakota Sioux.

After Yarrow.

Two plain black ones up, two black with natural spots up, two half moons up, and the transversely cross one up wins a pile. Two plain black ones, two black with natural spot up, two half moons up, and the buffalo's head up wins a pile. Two plain ones up, two with black spots up, two longitudinally crossed ones up, and the transversely crossed one up wins a pile. Two plain ones up, two with black spots up, buffalo's head up, and two long crossed up wins a pile.

The following auxiliary throws entitle to another chance to win: Two plain ones up, two with black spots up, one half moon up, one longitudinally crossed one up, and buffalo's head up gives another throw, and on this throw, if the two plain ones up and two with black spots with either of the half moon or buffalo's head up, the player takes the pile. Two plain ones up, two with black spots up, two half moons up, and the transversely crossed one up entitles to another throw, when, if all the black sides come up excepting one, the throw wins. One of the plain ones up and all the rest with black sides up gives another throw, and the same then turning up wins. One of the plain black ones up with that side up of all the others having the least black in them gives another throw, when the same turning

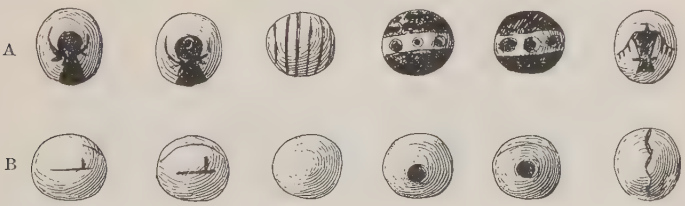


Fig. 87

PLUM STONES FOR GAME.

(A, obverse; B, reverse.)

Diameter, about ⅞ inch.

Yankton Sioux.

Cat. Nos. 23556, 23557, U.S.N.M.

up again wins. One half moon up with that side up of all the others having the least black on gives another throw, and if the throw is then duplicated it wins. The eighth seed, used by men, has its place in their game whenever its facings are mentioned above.

The permutations of the winning throws may be seen in the following table:

aa	*bb*	C	DD
AA	BB	*c*	*dd*
AA	BB	*c*	DD
AA	BB	C	DD
aa	*bb*	*c*	*dd*
aa	*bb*	C	*dd*

YANKTON SIOUX. Cat. Nos. 23556, 23557, U.S.N.M.

Six plum stone dice, part of two sets of four each (fig. 87). The designs are burnt, and two, the fourth and fifth, have perforations on both sides. Collected by Mr. Paul Beckwith in 1876.

The two dice to the left (fig. 87) bear a buffalo's head on one side and a pipe or calumet on the reverse. The die on the right has an eagle or thunderbird, with the lightning symbol on the reverse.

TAÑOAN STOCK.

TEWA. Santa Clara, New Mexico. Cat. No. 176707, U.S.N.M.

Set of three blocks of wood, 5¼ inches in length, 1 inch in breadth, and ⅜ inch in thickness (fig. 88). Flat and painted red on one side; opposite rounded and painted reddish brown. One stick has fifteen transverse notches painted green on the rounded side. The notches are divided by an incised cross painted yellow.[1]

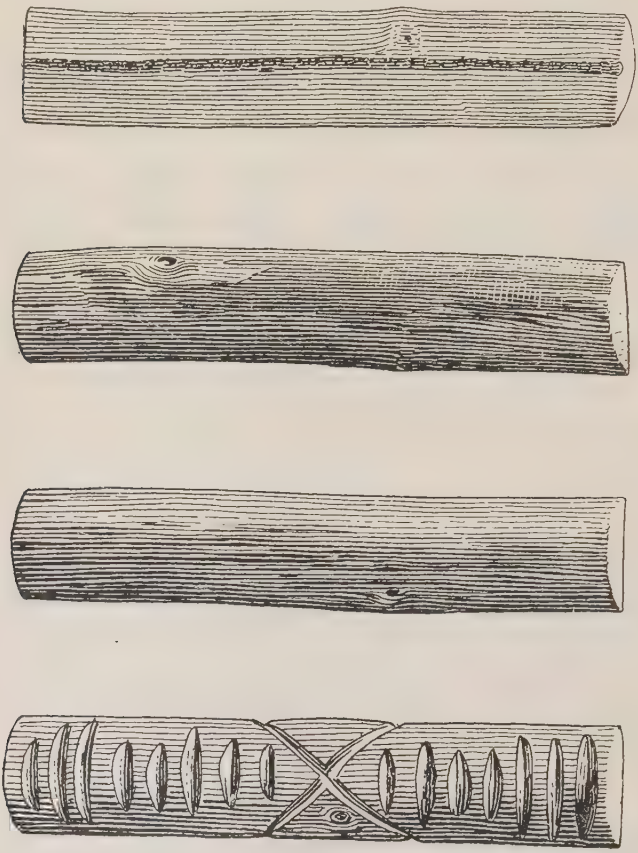


Fig. 88.

BLOCKS FOR GAME OF TUGI-E-PFĔ.

Length, 5¼ inches.

Tewa Indians, Santa Clara, New Mexico.

Cat. No. 176707, U.S.N.M.

The following account of the game, from an unpublished manuscript

[1] Another set, collected by Mr. T. S. Dozier, in the Museum of Archæology of the University of Pennsylvania (Cat. No. 20153), has the notches painted green, red, yellow, and blue and the cross red. These marks appear to imitate wrappings of cord of different colors, probably the wrappings of the *atlatl*.

by the collector, was kindly placed in my hands by Mr. F. Webb Hodge, of the Bureau of American Ethnology:

Grains of corn or pebbles are laid in the form of a square, in sections of ten each. The two players sit on either side. The sticks, called *e-pfe*, are thrown in turn on a stone placed in the square. The counts are as follows:

2 flat and notched stick notches up	= 15
3 round sides up	= 10
3 flat sides up	= 5
2 flat and 1 round side not notched up	= 3
1 flat and 2 round sides not notched up	= 1

The players move their markers between the grains or pebbles according to their throw, going in opposite directions. The one first returning to the starting point wins. This is the ordinary way. Sometimes, the markers being considered as horses, a player will attempt to kill his adversary's horses. In this case he so announces at the commencement of the game, and he then moves his marker in the same direction, and, by duplicating the first throw, or, if at any future stage of the game, always following, he succeeds in placing his marker where his adversary's is, by so doing he kills that horse (marker) and sends him back to the place of beginning. The latter may then elect to move in the same direction as before, and kill and send back his adversary, but, if he wishes, he may go in the opposite direction, in which case he does no killing. The game is called *Tugi-e-pfĕ*, meaning "the thrown stick" (*tugi* "to throw").

Mr. Dozier states that the stick with fifteen notches gives rise to the Mexican name of *Quince* (fifteen), which is sometimes given its Tewa equivalent *Tadi-pwa-no-pfe*, and *Juego de Pastor* (Shepherd's game).

TEWA. Isleta, New Mexico.

Mr. Charles F. Lummis[1] gives the following account of the game in Isleta:

The boys gather forty smooth stones the size of the fist, and arrange them in a circle about 3 feet in diameter. Between every tenth and eleventh stone is a gate of 4 or 5 inches. These gates are called *p'áy-hlah* (rivers). In the center of the circle, *pa-tól náht-heh*—"pa-tol house," is placed a large cobblestone, smooth and approximately flat on top, called *hyee-oh-tee-áy*. There is your *pa-tól* ground.

The *pa-tol* sticks, which are the most important part of the paraphernalia, are three in number. Sometimes they are made by splitting from dry branches, and sometimes by whittling from a solid block. The chief essential is that the wood be firm and hard. The sticks are 4 to 5 inches long, about an inch wide, and a quarter of an inch thick, and must have their sides flat, so that the three may be clasped together very much as one holds a pen, but more nearly perpendicular, with the thumb and first three fingers of the right hand. Each stick is plain on one side and marked on the other, generally with diagonal notches, as shown in fig. 89.

The only other requisite is a *kah-níd-deh* (horse) for each player, of whom there may be as many as can seat themselves around the *pa-tol* house. The "horse" is merely a twig or stick, used as a marker. When the players have seated themselves, the first takes the *pa-tol* sticks tightly in his right hand, lifts them about as high as his chin, and, bringing them down with a smart vertical thrust, as if to harpoon the center stone, lets go of them when they are within some 6 inches of it. The three sticks strike the stone as one, hitting on their ends squarely, and, rebounding several inches, fall back into the circle. The manner in which they fall

[1] A New Old Game, in A New Mexico David, New York, 1891, p. 183.

decides the "denomination" of the throw, and the different values are shown in fig. 89. Although at first flush this might seem to make it a game of chance, nothing could be farther from the truth. Indeed, no really aboriginal game is a true game of chance; the invention of that dangerous and delusive plaything was reserved for civilized ingenuity.

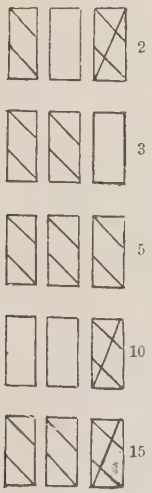


Fig. 89.
COUNTS IN PA-TOL.
From Lummis.

An expert *pa-tol* player will throw the number he desires with almost unfailing certainty by his arrangement of the sticks in his hand and the manner and force with which he strikes them down. It is a dexterity which any one may acquire by sufficient practice, and only thus. The five-throw is deemed very much the hardest of all, and I have certainly found it so.

According to the number of his throw the player moves his marker an equal number of stones ahead on the circle, using one of the "rivers" as a starting point. If the throw is five, for instance, he lays his "horse" between the fourth and fifth stones, and hands the *pa-tol* sticks to the next man. If his throw be ten, however, as the first man's first throw is very certain to be, it lands his horse in the second "river," and he has another throw. The second man may make his starting point the same or another "river," and may elect to run his "horse" around the circle in the same direction that the first is going or in the opposite. If in the same direction, he will do his best to make a throw which will bring his "horse" into the same notch as that of the first man, in which case the first man is "killed," and has to take his "horse" back to the starting point to try over again when he gets another turn. In case the second man starts in the opposite direction—which he will not do unless an expert player—he has to calculate with a good deal of skill for the meeting, "to kill" and to avoid being "killed" by No. 1. When he starts in the same direction as No. 1, he is behind, and runs no chance of being "killed," while he has just as good a chance to kill. But if, even then, a high throw carries him ahead of the first man—for "jumping" does not count either way, the only "killing" being when two "horses" come in the same notch—his rear is in danger, and he will try to run on out of the way of his pursuer as fast as possible. The more players the more complicated the game, for each "horse" is threatened alike by foes that chase from behind and charge from before, and the most skillful player is liable to be sent back to the starting point several times before the game is finished, which is as soon as one "horse" has made the complete circuit. Sometimes the players, when very young or unskilled, agree there shall be no "killing;" but unless there is an explicit arrangement to that effect, "killing" is understood, and it adds greatly to the interest of the game.

There is also another variation of the game, a rare one, however. In case the players agree to throw fifteens, all the *pa-tol* sticks are made the same, except that one has an extra notch to distinguish it from the others. Then the throws are as shown in fig. 90.

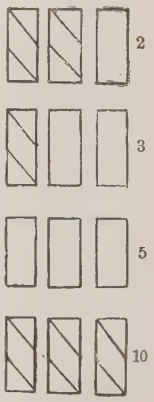


Fig. 90.
COUNTS IN PA-TOL.
From Lummis.

In reply to a letter of inquiry, Mr. Lummis writes me that he distinctly remembers having witnessed this game at Isleta, Santa Clara, San Ildefonso, Tesuque, and Taos (Tewan); at Acoma, Ti tsí-a-ma, and Cañada Cruz (Acoma colonies), Cochití, Laguna, El Rito, Sandia, and San Felipe (Keresan), and Zuñi.

I feel quite confident I saw it also in San Juan (Tewan), though of that I would not be positive. I can not remember seeing the game played in Jemez, Picuris, and Pojoaque (Tewan); in Sia (Keresan) or any of the Moqui Pueblos except Tehua (which of course is a village of migration from the Rio Grande). In Nambé (Tewan) I never saw it, I am sure.

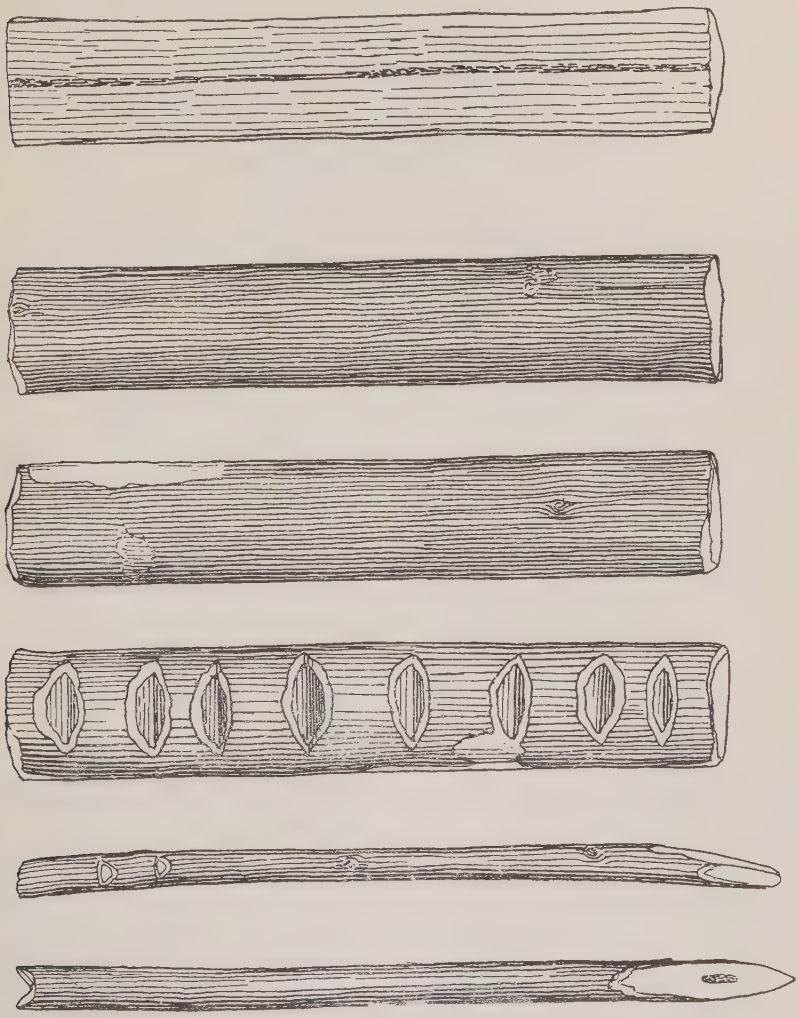


Fig. 91.

STAVES AND MARKING STICKS USED IN THE GAME OF CA-SE-HE-A-PA-NA.

Lengths, $4\frac{1}{4}$ and $4\frac{3}{4}$ inches.

Tewa Indians, Taos, New Mexico.

Cat. No. 20123, Museum of Archæology, University of Pennsylvania.

TEWA. Taos, New Mexico. (Cat. No. 20123, Mus. Arch., Univ. Penn.) Set of three sticks, $4\frac{1}{4}$ inches in length, $\frac{3}{4}$ inch broad, and $\frac{6}{16}$ inch thick (fig. 91.) One side round with bark and the other flat. One of the sticks has eight transverse cuts on the bark side, as shown in the figure, with

the opposite flat side smeared with red paint. Also two twigs, $4\frac{3}{4}$ inches in length, with sharpened ends, one having two nicks cut near one end

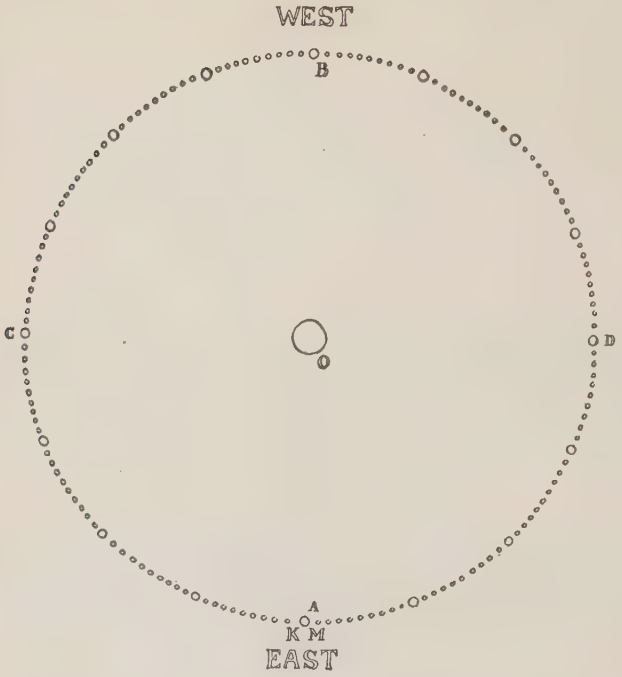


Fig. 92.

CIRCUIT FOR GAME OF CA-SE-HE-A-PA-NA.

Tewa Indians, Taos, New Mexico.

From a sketch by Dr. T. P. Martin.

to distinguish it. Employed in the game of *Ca-se-he-a-pa-na* (Spanish, *Pastore*), of which the collector, Dr. T. P. Martin, of Taos, has furnished the following account:

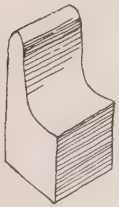


Fig. 93.

WOODEN DIE.

Kwakiutl Indians, British Columbia.

Field Columbian Museum, Chicago. (After Boas.)

A circle, from 2 to 3 feet in diameter (fig. 92), is marked on the ground with small stones. One hundred and sixty stones are used, with larger ones at each quarter, dividing the circle into four quarters of forty stones each. A line AB is marked out as a "river," and is usually marked from east to west. The line CD is designated as a "trail." A large stone is placed in the center.

There are two players, each of whom takes one of the little twigs, which are known as "horses." A player takes the three stones, holds them together, and drops them vertically upon the large stone. He counts according to their fall, and moves his horse as many places around the circuit. They throw and move in turn, going in opposite directions, one starting from K and the other from M. If M passes point B before K reaches it, and meets K's horse anywhere around the circle, K's horse is said to be "killed," and has to go back to A and start over again, and *vice versa*. A chief point in the game is to reach B before the other player, so as to kill him on the second half of the circle.

The counts are as follows:

2 flat and notched stick notches up	= 15
3 round sides up	= 10
3 flat sides up	= 5
2 flat and 1 round side not notched up	= 1
1 flat and 2 round sides not notched up	= 1

This game is usually played all night on the night of November 3d of each year. November 3d is known as "The Day of the Dead," and this game seems in some way to be connected with it, or rather with its celebration, but I can not find out any tradition connecting the two.

WAKASHAN STOCK.

KWAKIUTL. British Columbia.

Dr. Franz Boas[1] describes these Indians as using wooden dice (fig. 93) in a game called *Eibayu*. "The casts count according to the narrowness of the sides." The dice collected by him are in the Field Columbian Museum.

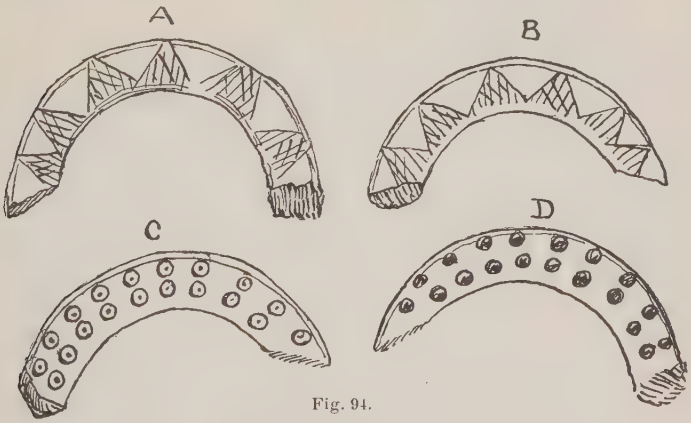


Fig. 94.

BEAVER TEETH DICE.

Length, 2 to 2⅛ inches.

Makah Indians, Neah Bay, Washington.

Cat. No. 23351, U.S.N.M.

MAKAH. Neah Bay, Washington. (Cat. No. 23351, U.S.N.M.)

Seven beaver teeth, probably part of two or more sets. Two—right and left—apparently from the same animal are similarly marked on the flat side with chevron pattern (fig. 94 AB). Two, also apparently from the same animal, marked with circles and dots (fig. 94 CD). Two teeth—right and left—are marked with three chevrons, and one odd tooth has ten circles. Collected by Mr. J. G. Swan.

The following account of the game is given by the collector:

Four teeth are used; one side of each has marks and the other is plain. If all four marked sides come up, or all four plain sides, the throws form a double; if two marked and two plain ones come up, it is a single; uneven numbers lose.[2]

[1] Sixth Report on the Indians of British Columbia, p. 10.

[2] The Indians of Cape Flattery, Smithsonian Contributions to Knowledge, 220, p. 44.

He also states this game is usually played by the women, and that the beaver teeth are shaken in the hand and thrown down.[1]

YUMAN STOCK.

COCOPA. (Cat. No. 76165, U.S.N.M.)

Set of four sticks of willow[2] wood, 8 inches long, about 1⅛ inches broad, and ½ inch thick (fig. 95). Flat on one side, which is uniformly marked lengthwise in the center with a band of red paint about ½ inch in width. Opposite, rounded and unpainted. Collected by Mr. Edward Palmer.

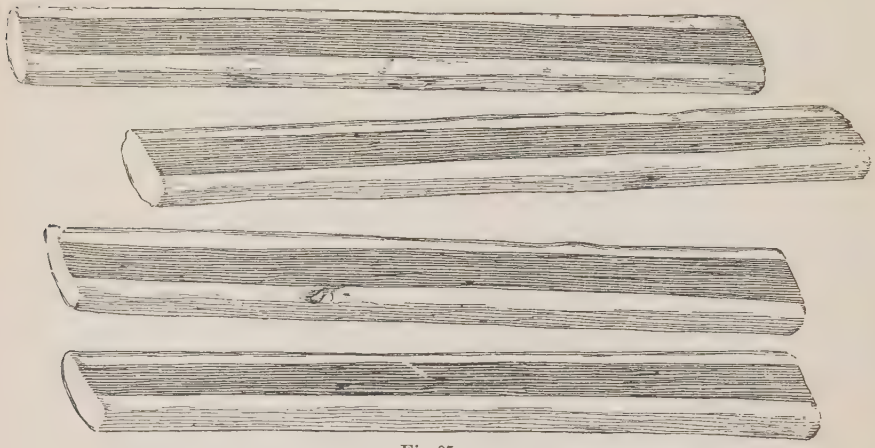


Fig. 95.

SET OF STAVES FOR GAME.

Length, 8 inches.

Cocopa Indians.

Cat. No. 76165, U.S.N.M.

HAVASUPAI. Arizona.

Mr. G. Wharton James has furnished the writer with the following account:

Squatted around a circle of small stones, the circle having an opening at a certain portion of its circumference called the *yam-se-kyalb-ye-ka*, and a large flat stone in the centre called *taā-be-che-ka*, the Havasupai play the game called *Hue-ta-quec-che-ka*. Any number of players can engage in the game.

The players are chosen into sides. The first player begins the game by holding in his hand three pieces of short stick, white on one side and red on the other. These sticks are called *toh-be-ya*, and take the place of our dice. They are flung rapidly upon the central stone, *taā-be-che-ka*, and as they fall counts are made as follows:

3 whites up	= 10
2 whites, 1 red up	= 2
2 reds, 1 white up	= 3
3 reds	= 5

[1] The Northwest Coast, or Three Years' Residence in Washington Territory, New York, 1857, p. 158.

[2] *Salix amygdaloides.*

Fig. 96.

SET OF BLOCKS FOR GAME.

Length, $6\frac{1}{8}$ inches.

Mohave Indians, Arizona.

Cat. No. 10334, U.S.N.M.

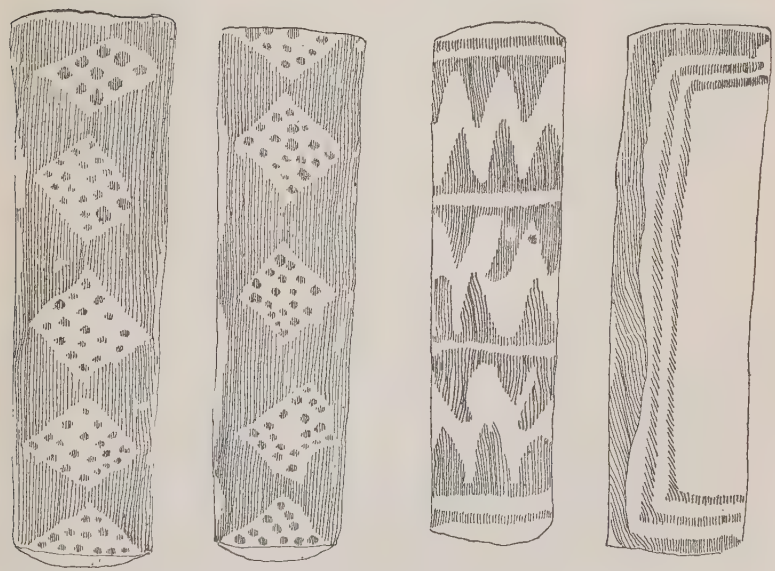


Fig. 97.

SET OF BLOCKS FOR GAME.

Length, 6 inches.

Mohave Indians, southern California.

Cat. No. 24166, U.S.N.M.

Tallies are kept by placing short sticks between the stones, *huc*, that compose the circle, one side counting in one direction from the opening and the other keeping tally in the opposite direction.

MOHAVE. Arizona. (Cat. No. 10334, U.S.N.M.)

Set of four blocks of willow[1] wood, $6\frac{1}{8}$ inches in length, 2 inches in width, and $\frac{1}{2}$ inch in thickness. Section ellipsoidal. One side painted red with designs as shown in fig. 96, and opposite, unpainted. Described as used by women. Collected by Mr. Edward Palmer.

MOHAVE. Southern California. (Cat. No. 24166, U.S.N.M.)

Set of four blocks of willow[1] wood, 6 inches in length, $1\frac{1}{2}$ inches in width, and $\frac{5}{8}$ inch in thickness. One side flat and painted brown with

Fig. 98.

GAMING STICKS.

Length, $5\frac{3}{8}$ inches.

Mohave Indians, Arizona.

Cat. No. 10090, Peabody Museum of American Archæology.

designs (fig. 97) similar to those on the preceding; opposite, rounded and unpainted. Collected by Mr. Edward Palmer.

MOHAVE. Arizona? (Cat. No. 10090, Peabody Museum.)

Set of four gambling sticks, $5\frac{3}{8}$ inches in length and $1\frac{1}{4}$ inches in width. Marked on one face with designs as shown in fig. 98; opposite sides plain. Collected by Mr. Edward Palmer.

MOHAVE. Arizona? (Cat. No. 10090, Peabody Museum.)

Set of four gambling sticks, $3\frac{1}{2}$ to $3\frac{3}{4}$ inches in length and $\frac{11}{16}$ inch in width. Marked on one face with red and black designs; opposite plain. Collected by Mr. Edward Palmer.

[1] *Salix amygdaloides.*

ZUÑIAN STOCK.

ZUÑI. New Mexico. (Cat. No. 69285, U.S.N.M.)

Set of three sticks of larch wood, $3\frac{3}{4}$ inches in length, 1 inch in breadth, and $3\frac{1}{16}$ inches in thickness (fig. 99). Section rectangular. One side painted red, opposite unpainted.

ZUÑI. New Mexico. (Cat. No. 69004, U.S.N.M.)

Set of three sticks of piñon wood (one missing), $3\frac{3}{4}$ inches in length, $1\frac{1}{8}$ inches in breadth, and $\frac{3}{16}$ inch in thickness. One side flat and blackened; opposite roughly rounded and unpainted. Ends cut straight across and painted black.

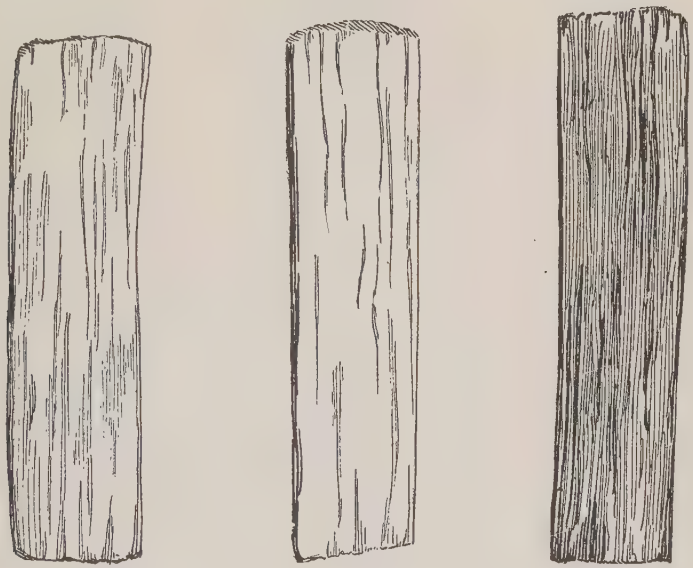


Fig. 99.

SET OF BLOCKS FOR GAME OF TA'-SHO'-LI-WE.

Length, $3\frac{3}{4}$ inches.

Zuñi Indians, New Mexico.

Cat. No. 69285, U.S.N.M.

ZUÑI. New Mexico. (Cat. No. 69355, U.S.N.M.)

Set of three sticks rudely shaped from piñon wood, $5\frac{1}{2}$ inches in length, $\frac{3}{4}$ inch in breadth, and about $\frac{1}{4}$ inch in thickness. Section rectangular, with both sides flat; one painted black, opposite plain.

ZUÑI. New Mexico. (Cat. No. 69352, U.S.N.M.)

Set of three sticks of piñon wood, $5\frac{1}{2}$ inches in length, $1\frac{1}{4}$ inches in breadth, and about $\frac{1}{4}$ inch in thickness. One side flat and painted black; opposite rounded and painted red.

ZUÑI. New Mexico. (Cat. No. 69284, U.S.N.M.)

Set of three sticks of piñon wood, $5\frac{1}{2}$ inches in length, $\frac{7}{8}$ inch in breadth, and about $\frac{3}{16}$ inch in thickness. Slightly rounded on both sides, one being painted black and the other red.

ZUÑI. New Mexico. (Cat. No. 69354, U.S.N.M.)

Set of three sticks of piñon wood, $5\frac{1}{2}$ inches in length, about $1\frac{3}{4}$ inches in breadth, and $\frac{3}{16}$ inch in thickness. Painted black on one side; opposite unpainted. Corresponding ends on one side cut straight across, and opposite with one corner rounded.

ZUÑI. New Mexico. (Cat. No. 69340, U.S.N.M.)

Set of three sticks of pine wood, 6 inches in length, $1\frac{5}{16}$ inches in breadth, and $\frac{7}{16}$ inch in thickness. Section rectangular. One side marked with triangles of red and black paint; opposite unpainted.

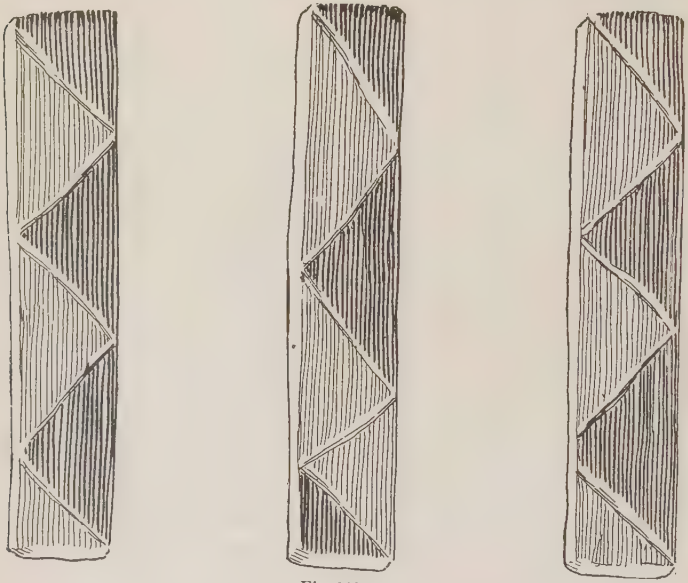


Fig. 100.

SET OF BLOCKS FOR GAME OF TA'-SHO'-LI-WE.

Length, 4 inches.

Zuñi Indians, New Mexico.

Cat. No. 69287, U.S.N.M.

ZUÑI. New Mexico. (Cat. No. 69287, U.S.N.M.)

Set of three sticks of white pine, 4 inches in length, $\frac{3}{4}$ inch in breadth, and $\frac{3}{16}$ inch in thickness (fig. 100). One face flat with triangles painted red and black and outlined by incised lines. Opposite rounded and unpainted.

ZUÑI. New Mexico. (Cat. No. 69281, U.S.N.M.)

Set of three sticks of yellow pine, $5\frac{1}{2}$ inches in length, 1 inch in breadth, and $\frac{3}{8}$ inch in thickness (fig. 101). One face flat and unpainted; opposite rounded and painted red and black in triangular designs, the triangles on one side being red with a black inner triangle and *vice versa*. The outline of the larger triangles is deeply incised.

ZUÑI. New Mexico. (Cat. No. 69003, U.S.N.M.)

Set of three sticks of basswood[1] $4\frac{5}{8}$ inches in length, $1\frac{5}{8}$ inch in breadth, and $\frac{5}{16}$ inch in thickness (fig. 102). Flat and painted light red on one side; opposite rounded and painted in triangular designs in red and black, the pattern being double that on the preceding: Cat. Nos. 69340, 69287, and 69281.

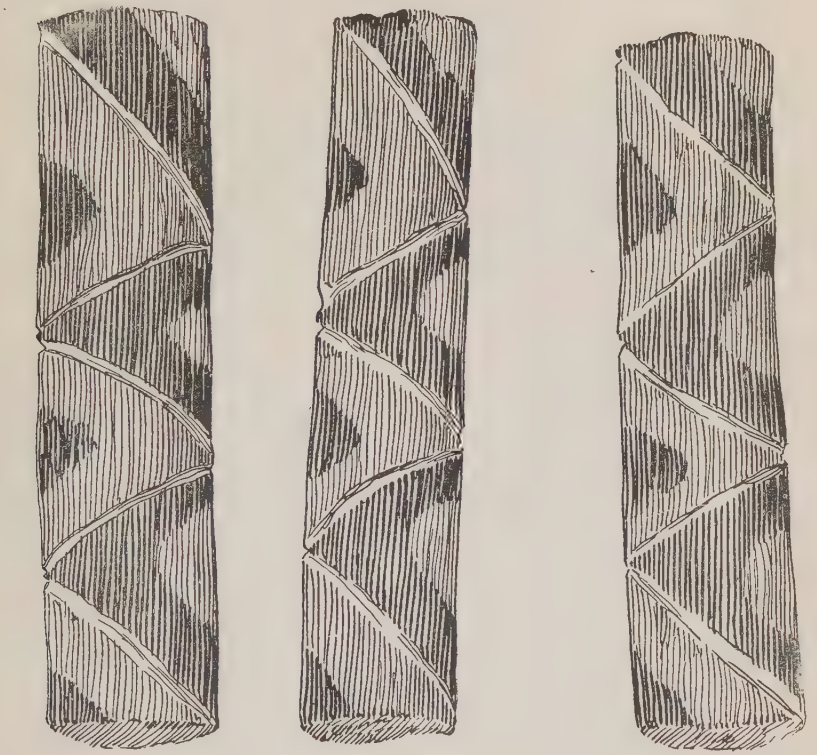


Fig. 101.

SET OF BLOCKS FOR GAME OF TA'-SHO'-LI-WE.

Length, $5\frac{1}{8}$ inches.

Zuñi, New Mexico.

Cat. No. 69281, U.S.N.M.

The preceding Zuñian staves were collected by Col. James Stevenson. They were all used, as I am informed, by Mr. Cushing, for the game of *Ta'-sho'-li-we*, or "wooden canes" (one of the seven sacred games of Zuñi), which he described to me as follows:

Ta'-sho'-li-we[2] is played according to the throws of three wooden blocks, painted red on one side and black upon the other, around a circle of stones placed upon the sand. Two or four players engage, using two or four splints as markers, and advancing, according to their throws around the circle, which is divided into forty parts by

[1] Deal boards, imported into Zuñi.

[2] *Ta'-sho'-li-we* was described by John G. Owens ("Some Games of the Zuñi") in the Popular Science Monthly for May, 1891. He gives the name of the central stone as

pebbles or fragments of pottery, and has four openings called "doorways" at its four quarters. At the commencement of the game four colored splints are arranged at these points: at the top (North) a yellow splint; at the left (West) a blue; at the bottom (South) a red, and at the right (East) a white splint. The blocks are tossed ends down on a disk of sandstone placed in the middle of the circle, and the counts are as follows:

3 red sides up =10
3 black sides up = 5
2 red and one black = 3
2 black and one red = 2

A count of ten gives another throw. When four play, the straws of the North and West move around from right to left, and those of the South and East from left to right. When a player's move terminates at a division of the circle occupied by an

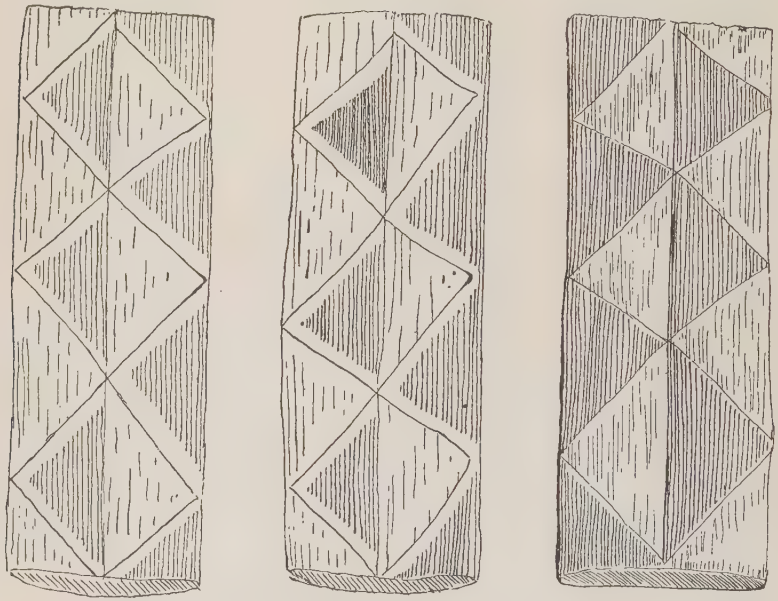


Fig. 102.

SET OF BLOCKS FOR GAME OF TA'-SHO'-LI-WE.

Length, 4⅝ inches.

Zuñi, New Mexico.

Cat. No. 69003, U.S.N.M.

adversary's straw, he takes it up and sends it back to the beginning. It is customary to make the circuit of the stones four times, beans or corn of different colors being used to count the number of times a player has gone around. The colors on the wooden blocks or dice symbolize the two conditions of men:

Red, light or wakefulness;

Black, darkness or sleep.

The splints have the following symbolism:

At top, yellow, north, air, Winter;

---

a-rey-ley and the dice *ta-mey*. For counting, each player has a horse or *touche*. "The horse is supposed to drink at the intervals between the groups of stones. One game which I witnessed had loaded rifle cartridges for stakes. Each player placed his bet within the circle."

At left, blue, west, water, Spring;
At bottom, red, south, fire, Summer;
At right, white, east, earth, Autumn.
The following is a vocabulary of the game:
Blocks: *Ta'-sho'-li'-we;* literally, "Of wood canes."
Splints: *Ti-we.*
Circle of stones: *I te tchi na kya a we;* literally, "From one to another succeeding."
Doorway: *A wena a te kwi a;* literally, "Doorway, all directions of."
Beans used as counters: *A-wi yah na-kya no-we;* literally, "For keeping count beans."

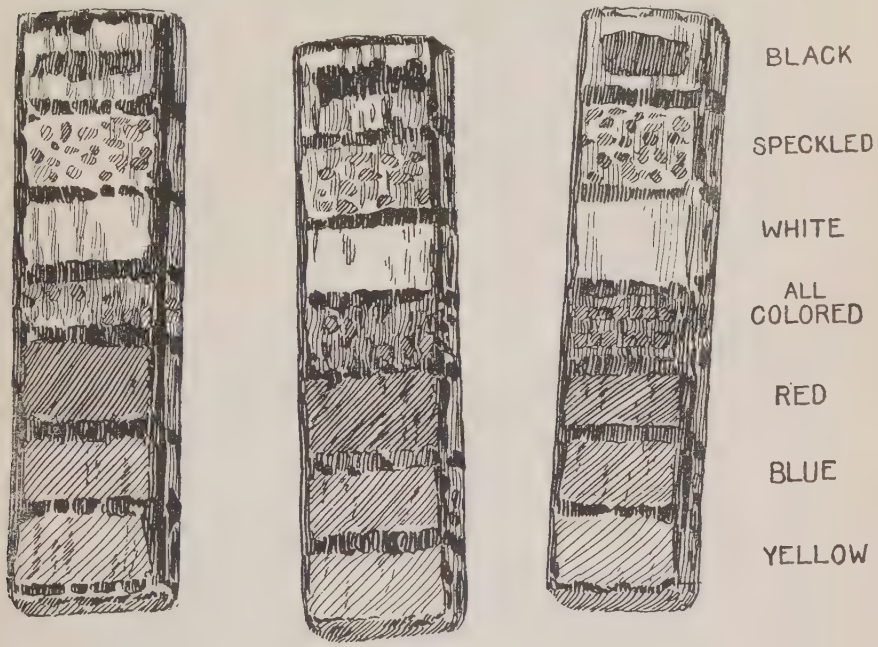


Fig. 103.

SET OF BLOCKS FOR GAME OF TEM-THLĀ-NAH-TA'-SHO'-LI'-WE.

Length, 4 inches.

Zuñi Indians, New Mexico.

Cat. No. 16531, Museum of Archæology, University of Pennsylvania.

From the name of this game, *ta'-sho'-li-we*, or "wood-canes" (wood-cane game), its origin may be referred to the Zuñian game of *Sho'-li-we* or "canes," the actual canes of which are replaced with wood in *Ta'-sho'-li-we.*

Mr. Cushing informs me that a basket game, similar to that described as existing among the Arapaho, Cheyenne, Sioux, etc., is also played in Zuñi under the name of *Thathl pa-tsi-we*, or "Tablet bounce-basket game."

ZUÑI. New Mexico. (Cat. No. 16531, Mus. Arch., Univ. Penn.)

Reproductions[1] of set of three blocks, originals of piñon wood, 4 inches in length, $1\frac{1}{8}$ inches in breadth, and $\frac{5}{16}$ inch in thickness (fig. 103).

[1] Made by Mr. Cushing.

Rectangular in section. One side uniformly painted white and opposite with transverse bands of color separated by black lines of paint, in the following order: Yellow, blue, red, variegated, white, speckled, and black.[1]

Mr. Cushing informs me that these blocks are used in a divinitory form of *Ta'-sho'-li-we*, called *Tem-thlā-nah-na-ta'-sho'-li-we*, "of all the regions wood-canes."

This game is employed in name divination and prognostication of an individual, usually of a youth, the colors being noted for the purpose of determining the rank and name significant thereof of the one for whom the divination is made.

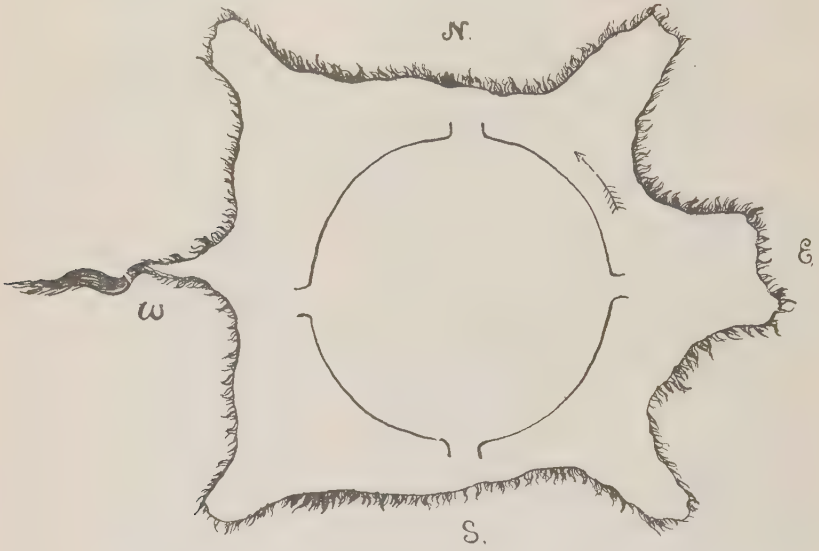


Fig. 104.

HIDE USED AS GAMING BOARD IN TEM-THLĀ-NAH-TA'-SHO'-LI-WE.

Zuñi Indians, New Mexico.

Sketch by Mr. Frank Hamilton Cushing.

In this game the counting grains are named for:
North: *Thlup tsi kwa kwe*, "Yellow medicine seed people."
West: *Thlí a kwa kwe*, "Blue medicine seed people."
South: *Shi lo a kwa kwe*, "Red medicine seed people."
East: *Kó ha kwa kwe*, "White medicine seed people."
Upper region: *Ku tsu a kwa kwe*, "Variegated medicine seed people."
Lower region: *Kwí na kwa kwe*, "Black medicine seed people."
Middle or all-containing region: *Í to pa nah na kwa kwe*, "Of all colors medicine seed people."

[1] For the significance of these colors in Zuñi see note, p. 679. The stick with notches (fig. 88), used in the Tewan game, suggests the probability that these painted sticks replaced others wrapped with colored thread or fabric. Compare with the ancient Chinese scepter (fig. 126) banded with five colors by being wrapped with colored cords.

ZUÑI. New Mexico. (Cat. No. 20031, Mus. Arch., Univ. Penn.)

Set of four sticks, 5½ inches in length, in two pairs, each of which consists of a length of reed split in the middle. The inner sides of the

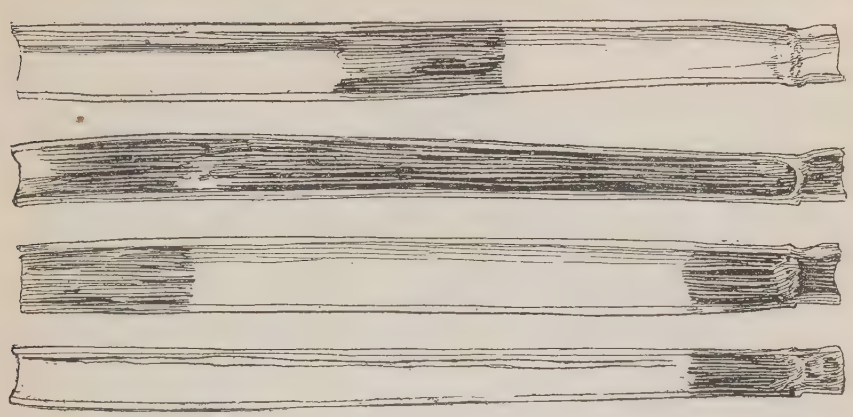


Fig. 105.

SET OF SACRIFICIAL CANES FOR SHO'-LI-WE.

(Reverse.)

Cat. No. 20031, Museum of Archæology, University of Pennsylvania.

reed are painted as shown in fig. 105, and the opposite rounded sides scratched with transverse lines and burned, as shown in fig. 106.

These were employed, according to Mr. Cushing, in the game of

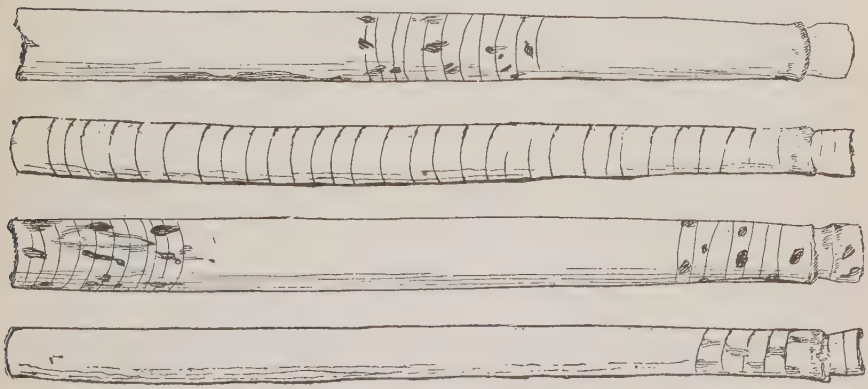


Fig. 106.

SET OF SACRIFICIAL CANES FOR SHO'-LI-WE.

(Obverse.)

Length, 5⅝ inches.

Zuñi Indians, New Mexico.

Cat. No. 20031, Museum of Archæology, University of Pennsylvania.

Sho'-li-we, or "canes," one of the four games[1] which are sacrificed to

[1] In addition to *Sho'-li-we* there were *Hápochiwe*, shuttlecock; *Íyankolotomawe*, hidden ball, and *Mótikwawe*, kicked stick. All were used in divination. Compare with the four Sia games described on p. 730.

the twin war gods Áhaiyuta and Mátsailema. These particular canes were not made to play with, but for the purpose of sacrifice.

ZUÑI. New Mexico. (Cat. No. 69289, U.S.N.M.)

Two sets, each of four sticks, one of $7\frac{3}{4}$ inches and the other 7 inches

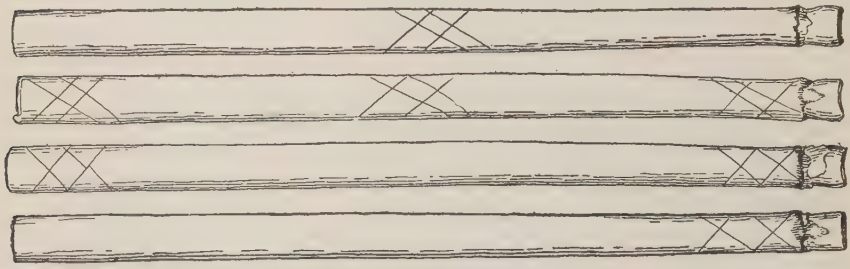


Fig. 107.

SET OF SACRIFICAL CANES FOR SHO'-LI-WE.

(Obverse.)

Zuñi Indians, New Mexico.

Cat. No. 69289, U.S.N.M.

in length. Made in pairs, like the preceding, of split reed. The inner sides of the reed are painted like the preceding. The outer sides of the longer set are unmarked, while those of the shorter set are marked, as shown in fig. 107.

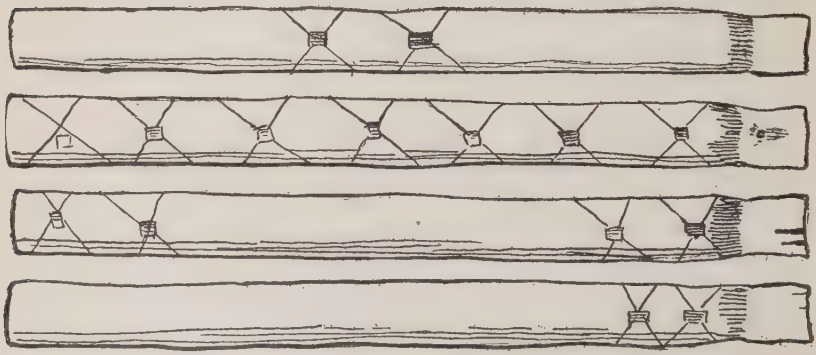


Fig. 108.

SET OF CANES FOR GAME OF SHO'-LI-WE.

(Obverse.)

Length, $6\frac{1}{8}$ inches.

Zuñi Indians, New Mexico.

Cat. No. 69277, U.S.N.M.

Mr. Cushing informs me that these two sets were used together, also for sacrificial purposes, the longer one being offered to Áhaiyuta and the shorter to Mátsailema.[1]

[1] Mátsailema is somewhat shorter in statue than his twin brother, and all of his things are made somewhat shorter. He always wears a shorter war club and shorter bow. (Cushing.)

SHRINE OF THE WAR GODS.
Twin Mountain, Pueblo of Zuñi.

ZUÑI. New Mexico. (Cat. No. 69277, U.S.N.M.)

Set of four sticks, 6½ inches in length and ½ inch in width, made of split cane. The inner sides painted like the preceding, and the rounded sides scratched with cross marks, as shown in fig. 108. Collected by Col. James Stevenson.

ZUÑI. New Mexico. (Cat. No. 69278, U.S.N.M.)

Set of four sticks, 6 inches in length and ½ inch width, made of split cane. The inner sides painted like the preceding, and the rounded sides marked with cuts, as shown in fig. 109. This set, with the one preceding, was intended for actual use, and is made of heavy cane, with

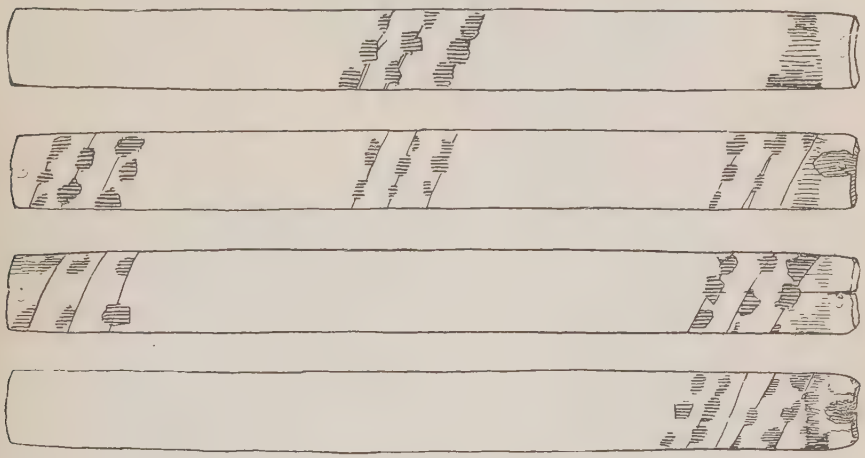


Fig. 109.

SET OF CANES FOR SHO'-LI-WE.

(Obverse.)

Length, 6 inches.

Zuñi Indians, New Mexico.

Cat. No. 69278, U.S.N.M.

the inside charred at the edges, and unlike the sacrificial sets, which consist of common marsh reed. Mr. Cushing has kindly placed in my hands the following hitherto unpublished account of *Sho'-li-we:* [1]

The game of *Sho'-li-we* is certainly the most distinctive of any practiced by the Zuñi Indians. It is not confined to them, but forms of it are found among all the

[1] Mr. Owens described *Sho'-li-we* in the paper referred to in a preceding note (p. 773). The names of the four sticks he gives as follows: The one whose concave side is entirely black, *quin,* the Zuñi for black; the one with one black end, *path-tō;* with two black ends, *kō-ha-kwa;* and the one with a black center, *ath-lu-a.* He figures two of the reeds, and the manner of holding the sticks, which he describes as thrown with the right hand against a suspended blanket and allowed to fall on another blanket. "Two of the pieces belong to each man and are companions. There is a pool with twelve markers, and he who wins the markers wins the game. The winner takes the twelve markers up into his hands and breathes on them. This is because they have been good to him and allowed him to win. It is wholly a game of chance, and horses, guns, saddles, and everything are staked upon the throw.

more settled of the present Indians in both our own southwest, and in northern, western, and central Mexico; while variants of it and derived games may be traced over well-nigh the whole western half of our continent.

A study of the distinctive marks of the different sticks or cane slips used in this game by the Zuñi would seem to indicate that this peculiar form of it is the most primitive. The reason for this will subsequently appear.

The name *shó'-li-we* is derived from *shó o li*, "arrow," and *we*, plural ending, signifying "parts of," *shó we* being the plural of simple arrows. *Shó o li*, or "arrow," is derived in turn from *shó o le*, "cane," the termination *li* in the derived word being a contraction of *li a*, and signifying "out of," "from," or "made of." Thus, the name of the game may be translated "cane arrows," or "cane arrow pieces" or "parts."

These "parts" consist of four slips of cane. From the fact that these slips are so split and cut from the canes as to include at their lower ends portions of the joints or septæ of the canes, and from the further fact that they are variously banded with black or red paint, or otherwise, it may be seen that they represent the footings or shaftments of cane arrows in which the septæ at the lower ends serve as stops for the footing or nocking-plugs.[1]

A study of the bandings by which these cane slips are distinguished from one another reveals the very significant fact that they are representative of the rib-bandings of cane-arrow shaftments.

I have found that sets of Zuñi, as well as the ancestral Cliff Dweller arrows, were thus ribbanded with black or red paint to symbolize, in the arrows so marked, the numerical and successional values of the Four Quarters, each set, especially of war arrows, consisting of four subsets, the shaftments of each differently marked. The reasons for this, and processes of divination by which the members of the different sets among the arrows were determined during their manufacture, I have set forth in a paper on "The Arrow," published in the Proceedings of the American Association for the Advancement of Science, 1895, and also in the American Anthropologist for October of the same year.

In the second part of that paper, the publication of which was delayed by my Florida explorations, I proceeded to show how these various facts indicated quite clearly that the Zuñi game of *Shó'-li-we* was, as its name implied, developed from the use of actual arrows for divination; and I further instanced many ceremonial usages of simple or ceremonial arrows in such divinatory processes as further demonstrating this claim.

It may be well for me to preface a description of the four cane slips constituting the principal apparatus of the game by a statement or two relative to the successional numbers of the Four Quarters as conceived in Zuñi dramatography.

The Chief or "Master" region, as well as the *first*, is the North, designated the Yellow; believed to be the source of breath, wind, or the element Air, and the place of Winter; hence of violence or war, and therefore Masculine.

The next or *second* region is the West, designated the Blue; believed to be the source of moisture or the element Water and the place of Spring, or renewal and fertility; hence of birth, and therefore Feminine.

The next, or third, is the South, designated as the Red; believed to be the source

[1] The canes are split with reference to the notion that one side is masculine or north, and the other feminine or south. This is determined by the direction or character of the natural growth, as well as by the presence or absence of the leaf pocket in the joint on the one side or the other of that particular section which forms the shaftment of the arrow (Cushing). In ancient China, according to the Chow Le (LXII, 37), the arrow maker floated the arrow longitudinally upon water to determine the side which corresponded to the principle of inertia and the side which corresponded with the principle of activity. The former sank, while the latter rose. He cut the notch with reference thereto.

of heat or the element Fire, and the place of Summer, of growth and productivity; hence of fostering, and likewise Feminine.

The last, or *fourth* of the *earthly* regions represented in the ordinary sheaf of arrows and in the game, is the East, designated the White, and believed to be the source of seeds and the element Earth, and the place of Autumn, of new years, and hence of creation; therefore Masculine again.[1]

These various regions and their numbers and meanings are symbolized on the arrows of the Four Quarters by differences in their ribbandings (fig. 110).

Those of the North were characterized by a single medial ribbanding around the shaftment, sometimes of yellow, but more usually of black, the color of death.

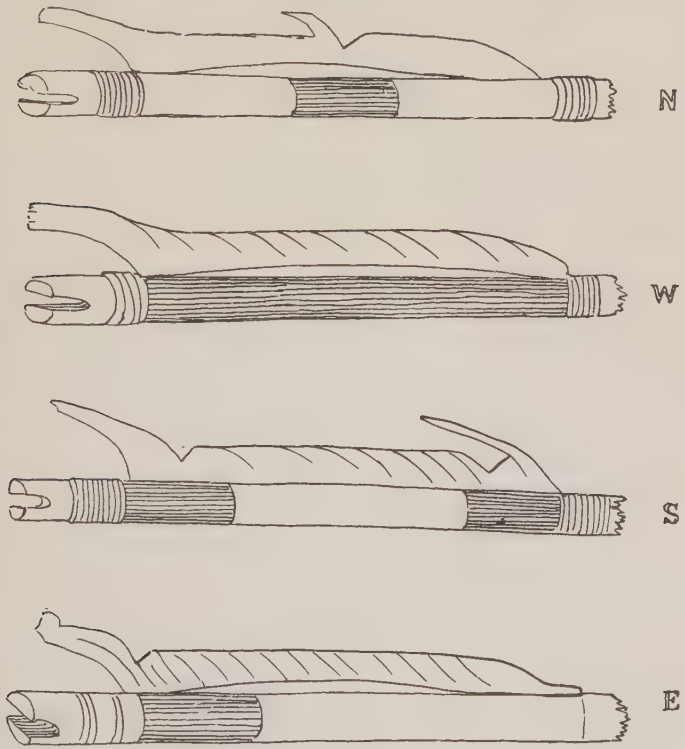


Fig. 110.

ARROW SHAFTMENTS OF THE FOUR DIRECTIONS, SHOWING RIBBANDING AND CUT COCK FEATHERS.

Zuñi.

From a sketch by Frank Hamilton Cushing.

Those of the West were also singly ribbanded coextensively with the shaftment, but there was oftentimes a narrow terminal band at either end of this broad band, sometimes of blue or green, but usually of black.

Those of the South were characterized by two bands midway between the two ends and the middle, sometimes of red, but usually of black.

Those of the East were characterized by either two narrow bands at either end, leaving the whole medial space of the shaftment white, or more often by a single band at the upper end of the shaftment, sometimes composed of two narrow black fillets inclosing white, but usually merely black and not double.

[1]See Outlines of Zuñi Creation Myths, Thirteenth Annual Report of the Bureau of Ethnology, p. 369.

In the highly finished arrows the cock or "tail" feathers were notched and tufted to correspond numerically and positionally with the bandings, for mythic reasons into which it is not necessary to enter here.

Each of the four cane slips was banded to correspond with the ribbandings of one or another of these sets of the arrows of the Four Quarters; but the paint bands (fig. 105) were almost invariably black and were placed in the concavity of the cane slips (figs. 106–9), not on the periphery (which was, however, scorched, scored, or carved to correspond), evidently to keep the paint from being worn off by handling and casting.

Thus the cane slip of the North was banded only at the middle, and was called *á-thlu-a*, or the "All Speeder," or "Sender" (*Á*, "all," and *thlu-ah*, "to run," "speed," or "stand ready").

The cane slip of the West was blackened its full length and was called *K'wi'-ni-kwa*, or the "Black" (medicine), from *K'wi-ná*, "black," and *ak'-kwa*, "medicine" or "sacred."

The cane slip of the South was doubly banded, as was the arrow of the South, and was called *pathl-to-a*, or "divider divided" ("bordered, inclosed"), from *pathl-to*, "border," "edge," "end," and *oa*, "to become," "to do," or "make to do."

Finally, the cane slip of the East was banded only at one end, and was called *Ko'-ha-kwa*, the "White," or the "White Medicine" (*K'ha-na*, "white," and *ak-kwa*, "medicine").

In addition to the banding and scoring of these cane slips, they were, in cases of great importance (as in sets made from the captured arrows of some celebrated foeman), notched at the ends, as I have said the cock feathers were notched; but this old practice has fallen into disuse to such extent that I have seen only one venerated set so notched. In this set, if I observed aright, the notches corresponded in number as well as in place, whether at sides or in the middle of the ends, with the number and positions of the bandings and of the tuftings on the cock feathers of the arrows from which, probably, they were made. The normal numerical value of the cane slips agreed with the successional values of the regions they belonged to—that is, the slip of the North made one; that of the West two; that of the South three, and that of the East four. But as this gave unequal values, other values or counts were added, according as the slips fell concave or convex sides uppermost, and especially according to the thrower.

That this may be understood, the general nature of the game as essentially a sacred tribal process of divination must be considered. Formerly *Sho'-li-we* was exclusively a game of war divination, and was played only by Priests of the Bow, members of the esoteric society of war shamans.

These members were, according to their totems and clans, members of the clan groups corresponding to the several quarters or sacred precincts of North, West, South, East, Upper, Lower, and Middle regions. But since there were only four regions concerned in the wage of war, clansmen of the upper and nether regions were relegated to the east and west, since the places of the upper and lower regions in the sacred diagram were in the Northeast—between the East and North, and in the Southwest—between the West and South; while clansmen of the middle might, as determined by the casts of their arrow canes, belong to anyone of the other regions, since the midmost was the synthetic region, the all-containing and the all-contained place, either the first, therefore, or the last. This war game of the Priests of the Bow was played semiannually at the festivals of the Twain Gods of War, Áhaiyuta and Mátsailema, patrons of the game by virtue of the vanquishment of the Creational God of Gambling, *Mi-si-na*, the Eagle-star God, whose forfeited head now hangs in the Milky Way, and whose birds are the god-servants of war and the plumers of the canes of war.

It is played at such times as a tribal divination; a forecast for war or peace, for prosperity or adversity, and is accompanied by tribal hazards and gambling. But at other times it is played for the determination of peace or war, of the direction or

precautions to be taken in defensive or offensive operations or preparations. As thus played, there must be four participants. Each possesses his own canes. In the uppermost room of the Pueblo (now fallen), there was formerly a shrine of the game. Here during terrific sand storms or at night the players gathered to divine. To the middle of the ceiling was suspended a *jical* or large round bowl-basket, over which a deerskin was stretched like a drumhead. Immediately below this, spread over a sacred diagram of prayer meal representing the terrace or cloud bed of the Four Quarters, on the floor, was a buffalo robe, pelt side up, head to the east, left side to the north, etc. (fig. 104). Upon this pelt a broken circle was traced either in black lines or dots, and with or without grains of corn (forty for each line, the colors corresponding to the quarters as above described), and the openings (canyons or passageways) occurring at the four points opposite the four directions. (It should be observed that a cross (+) was sometimes painted both on the center of the skin on the basket drum and on the hide beneath, the upper symbolic of Áhaiyuta, and the lower of Mátsailema, the Twin War Gods.)

The four players chose their places according to the clan groups and directions or quarters they represented: the player of the North between the eastern and northern passageway; the player of the West between the northern and western passageway, and so on. The players of the East and North represented war, and (in other modes of the game) masculinity; those of the West and South, peace and femininity.

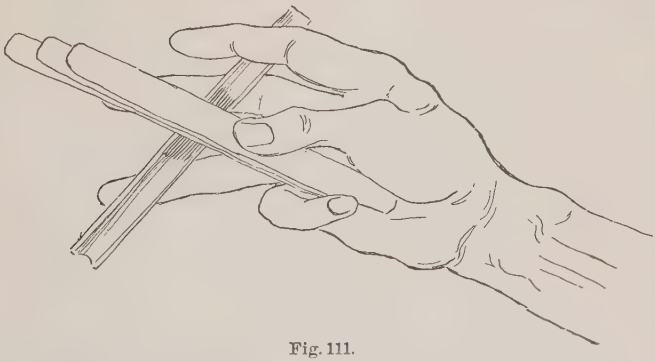


Fig. 111.

MANNER OF HOLDING CANES IN TOSSING IN GAME OF SHO'-LI-WE.

Zuñi Indians, New Mexico.

From a drawing by Frank Hamilton Cushing.

Before taking their places they muttered prayers, or rather rituals, clasping the playing canes lengthwise between the palms, breathing deeply, and from the close of the prayers, repeatedly upon them, rubbing and shuffling them vigorously, from which comes the title of a skilled player or a gambler: *shós-li*, "cane rubber" or "cane shuffler." As they took their seats, each placed under the edge of the buffalo hide in front of his place the pool, consisting of sacred white shell beads, or of little tablets representative of various properties and thus forming a kind of currency, since these little symbols were redeemable in the properties they represented or in commodities of equal value by agreement. Each also laid down at his right side on the edges of the robe over the pool two kinds of counters, usually a set of counting straws of broom grass, about six or seven inches long, worn by much use, and varying in number according to the proposed game. From ten to forty or forty-two, or from one hundred to one hundred and two (this latter divided at random into four bundles), was selected by each player. The additional counters were supplied by beans or corn grains, each set, or the set of each player, being of his appropriate color. Four splints, the moving pieces of the game, were laid in their places by the left sides of the passageways.

Each player then shuffled his cane cards back and forth in his palms as before described, as though to smooth and heat them, addressed them, especially the stick of his special quarter, as (for the East) "*Tchím-mi kó-ha-kwa tâ i yäthl tâ tá!*" "Now then, white one, come thou uppermost!" Then laying the all-sender (or his special slip as such) across the two middle fingers and the other three slips upon it inside of one another, his thumb pressing over their midst, the ends pointed outward over the index finger, and the bases held down to the base of the palm by the bent-over little finger (fig. 111), he quickly breathed or puffed upon them, shouted at them, and cast them skillfully against the stretched skin of the basket, so that they rebounded swiftly and fell almost unerringly within the circle on the *pé wine* or bed of buffalo hide. Now it was noted which slip lay uppermost over the others. If the White man threw, and if the white stick lay uppermost over all the others, he uttered

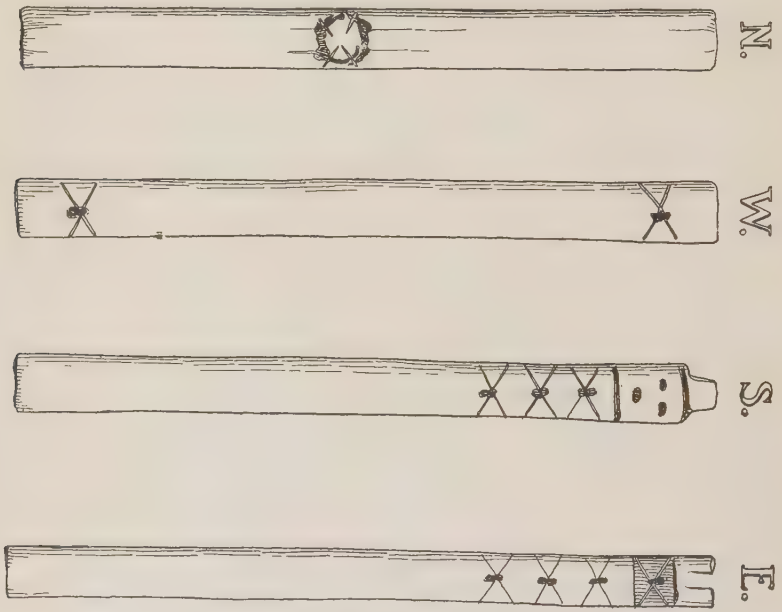


Fig. 112.

SET OF CANES FOR SHO'-LI-WE (REPRODUCTIONS).

Length, 5½ inches.

Zuñi.

Cat. No. 16543, Museum of Archæology, University of Pennsylvania.

thanks and the cast counted him four and gave him the privilege of another cast. If, moreover, all three slips (except his sender) lay concave sides upward, they counted him ten and gave him a second additional throw. If all three fell convex side up, they counted him five. If two concave sides and one convex side up, they counted him three, and if two convex sides and one concave side up they counted him only one. The player who had the largest number of both kinds of counts after each had tried, led off in the game and was supposed to be favored by the gods at the beginning. With but a slight change in the system of the counting, the game was continued; that is, the double counts were kept if the process included gambling—that is, "willingness to sacrifice"—but only the counts according to the regions, if the game was purely an arrow or war divination. But it is to be noted that in either case an ingenious method was resorted to in order to equalize the counts. Since the North or Yellow man could gain only one and a double throw if his slip

came uppermost, he gained the count of his opponent of the South, if his slip, the slip of the North, fell uppermost on the Red man's slips. The latter thus forfeited alike his double throw and his appropriate number, three. The tally of these purely cosmical counts was kept with the bundle of splints; the tally of the cast-counts or their sums were kept with the grains by counting out, and that of the individual by moving the pointer of the passageway as many dots or grain-places to the left as the cast called for. If a player of the East or North overtook a player of the West or South, if his pointer fell in the same space, he maimed his opponent—sent him back to his passageway—and robbed him of his load; that is, took or made him forfeit his counts.

The completion of the fourth circuit by any one of the players closes the ordinary game, providing the sum of the cosmical counts had been won by him, and the player who, with his partner, had the largest aggregate of both lot and cosmical counts was the winner.

There were many variants of this game as to counts. Some of these were so complicated that it was absolutely impossible for me to gain knowledge of them in the short practice I had in the play. I have given here, not very precisely or fully, the simplest form I know, except that of the lot and diagram, which was quite like that of *Ta'sho'-li-we* (or wood canes), which may be seen by the above description to be an obvious derivative both in mode and name of the older game of "canes." It was evidently thus divorced for purposes of exoteric play, as it is practiced not only by men but also by women.

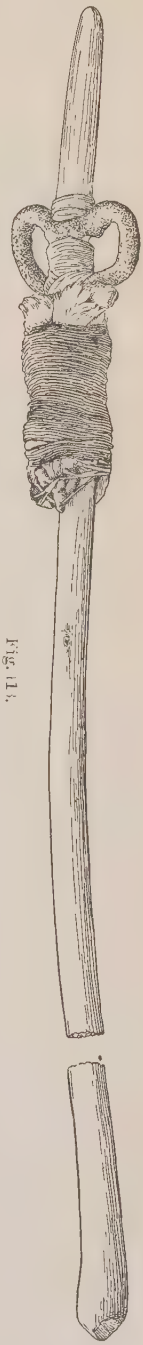


Fig. 113.

CLIFF DWELLER ATLATL (RESTORED).

Length, 15 inches.

Museum of Archæology, University of Pennsylvania.

Fig. 112 represents the obverse of a set of Zuñi canes for *Sho'-li-we* reproduced from memory by Mr. Cushing for the writer in the summer of 1893. It will be observed that the *a'-thlu-a*, the uppermost cane in fig. 112, corresponding with the north, is marked on the convex side with a cross, agreeing directly in this respect with one of the sticks in the Tewan game (fig. 88). This peculiarity, in one form or another, is repeated throughout almost the entire series of implements described, the obverse of one of the sticks in many of the sets being carved or burned, while in others one of the staves is tied about the middle. In attempting to account for this it occurred to the writer to compare the Zuñi stick bearing the cross mark with an *atlatl* or throwing stick (fig. 113) from a Cliff dwelling in Mancos Canyon, Colorado, in the University of Pennsylvania Museum.

Mr. Cushing had already suggested to me that the *a'-thlu-a*, placed beneath the others in throwing corresponded with the *atlatl*. The comparison confirmed his suggestions. The cross mark is clearly the cross wrap-

ping of the *atlatl* (fig. 114) for the attachment of finger loops. In the opinion of the writer, the Zuñi canes may be regarded as symbolic of the *atlatl* and three arrows, such as are seen carried by the gods in

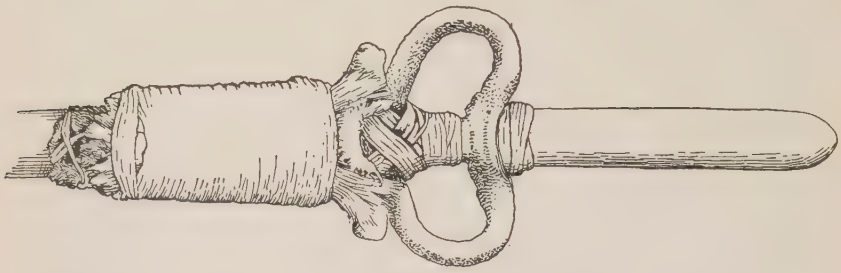


Fig. 114.

HANDLE OF ATLATL SHOWING CROSSED WRAPPING FOR ATTACHMENT OF FINGER LOOPS.

Cliff dwelling, Mancos Canyon, Colorado

Museum of Archæology, University of Pennsylvania.

Mexican pictures. From the evidence afforded by the implements employed, the games with tossed canes, staves, etc., I conclude that they must all be referred to the region of cane arrows and the *atlatl*, probably Mexico and the southwestern United States.

A summary of the games described in the preceding pages is contained in the following tables. The games of this class I have found recorded as existing among some sixty-one tribes, comprised in twenty-three linguistic stocks, described or collected by some seventy-five observers, extending from the year 1634 down to the present, and represented by some ninety specimens from forty-one tribes, eighteen stocks, and thirty-nine collectors in the five principal American museums of ethnology: Washington, New York, Chicago, Cambridge, and Philadelphia, and the hands of five individuals. The older accounts of the game among the Indians of Mexico are not included in this enumeration.

	Linguistic stock.	Tribe.	Place.	Museum.	Museum No.	Name.	Played by—
1	Algonquian	Arapaho	Indian Territory	U.S.N.M	152802 3	Ta-ú sétá tina	Women.
2	do	do	do	do	165765		
3	do	do	do	do	165785*a*		
4	do	Cheyenne	do	do	152803	Mónshimûnh	Do.
5	do	do	Montana			Mŏn shĭ mo ŭt	Do.
6	do	Chippewa	Lake Superior region			Puggesaing	
7	do	do	do			Athergain	
8	do	Illinois	Illinois				
9	do	Massachusetts	Massachusetts			"Hubbub"	
10	do	Menominee	Wisconsin			Âkqa'siwôk	
11	do	Micmac	Nova Scotia	M.A.U.P	18850	Wŏltĕs tŏmkwŏn	
12	do	do	do			Wŏbunarunk	
13	do	do	New Brunswick	M.A.U.P	20125	Altéstagen	
14	do	do	do	P.M.A.A. and E	50792		
15	do	do	do	do	50804		
16	do	Narragansett	Rhode Island			Wunnaugonhómmin	
17	do	Nipissing	Canada			Pakesanak	Do.
18	do	Norridgewock	do				
19	do	Ojibway (Chippewa)	Lake Superior region				
20	do	do	do			Beg-ga-sa	
21	do	Passamaquoddy	Maine			All-tes-teg-enŭk	
22	do	do	do			Wy-pen-og-enuk	
23	do	Penobscot	do	M.A.U.P	16551	Wer-lar da har-mun-gun	
24	do	do	do	do	20951		
25	do	Siksika	Canada				
26	do	do	Montana			O nes teh	Do.
27	do	do	do	F.C.M	51693		
28	do	do	Alberta, Canada	do	51654	Nitsitaiep-sktpsepian	
29	Athapascan	Apache (White Mountain)	Arizona	U.S.N.M	152696		Do.
30	do	do	do	M.A.U.P	18619	Sé-tich-ch	Do.

American Indian stave and dice games—Continued.

	Linguistic stock.	Tribe.	Place.	Museum.	Museum. No.	Name.	Played by—
31	Athapascan	Navajo	New Mexico	U.S.N.M.	9557		Women.
32	do	do	Arizona	do	74735		Do.
33	do	do	Arizona, New Mexico			Tsĭu-dĭ'l	Do.
34	do	do	do				
35	do	do		M.A.U.P	16540	Set tilth	Do.
36	Caddoan	Arikara		U.S.N.M.	6342		
37	do	do			6355		
38	do	Pawnee	Oklahoma				Do.
39	do	do					Do.
40	Eskimauan	Eskimo	St. Lawrence Bay, Alaska				Do.
41	do	do					
42	Iroquoian	Cherokee	North Carolina				
43	do	Delaware	Delaware Valley			Black eye and white eye	Do.
44	do	Huron	Ontario, Canada				
45	do	do	do				
46	do	do	do				
47	do	do	do				
48	do	do	do				
49	do	do	do				Do.
50	do	do	do				
51	do	Huron (Wyandot)	do				Do.
52	do	Iroquois	Northern Pennsylvania and Southern New York.				
53	do	Mohawk	New York			T8atenna8eron	
54	do	do	do			T8atuenha8inneton	Do.
55	do	Onondaga	do			Ta-you-nyun wát-hah	
56	do	do	do			Ta-yune-oo-wáh-es	
57	do	Seneca	do			Gus-ga-e sá-tä	
58	do	do	do			Gus ka-eh	

59	Iroquoian	Seneca	New York	M.A.U.P	21072		
60	do	do	do	do	21073		
61	do	Tuscarora	do				
62	Keresan	Acoma	N Mexico				
63	do	Cochité	do				
64	do	Laguna	do			Ka-wá-su-kuts	
65	do	San Felipe	do				
66	do	Sia	do			Washkasi	
67	Kiowan	Kiowa	Indian Territory	M.A.U.P	16535 16536	Zohu ahl	Do.
68	do	do	do	U.S.N.M	152908*a*	Tsoñā	Do.
69	do	do	do	do	152908*b*	do	Do.
70	do	do	do	do	152908*d*	do	Do.
71	do	do	do	do	152908*c*	do	Do.
72	do	do	do	do	152909*a*	do	Do.
73	do	do	do	do	152909*b*	do	Do.
74	do	do	do	do	152909*c*	do	Do.
75	Koluschan	Tlingit	Shakan, Alaska	A.M.N.H	E 650	Kêt chu[1]	Do.
76	do	do	do	do	E 650		Do.
77	do	do	do	do	E 894		Do.
78	do	do	do	do	E 1557		Do.
79	do	do	Sitka, Alaska	do	E 1859		Do.
80	Lutuamian	Klamath	Oregon	U.S.N.M	24126		
81	do	do	do			Shkúshash	Do.
82	Mariposan	Yokut	California	U.S.N.M	19695		Do.
83	Natchezan	Natchez	Louisiana				Do.
84	Piman	Papago	Arizona	U.S.N.M	174516	Ghing-skoot	
85	do	Pima	do	do	27842		
86	do	do	do	do	27843		

[1] Die called.

American Indian stave and dice games—Continued.

	Linguistic stock.	Tribe.	Place.	Museum.	Museum. No.	Name.	Played by—
87	Piman	Pima	Arizona	U.S.N.M	76017		Men.
88	do	do	do	do	76018		Women.
89	do	Tarahumara	Pueblo of Carichic, Chihuahua, Mexico.	A.M.N.H	65/846	Ro-ma-la-ka	
90	do	Tepeguana	Chihuahua	do	65/911	In-tu-vi-ga-izu-liga-i-ra-ga-i	
91	do	do	do	do	65/910	do	
92	do	do	do	do	65/1039	do	
93	do	do	do	do	65/1038	do	
94	Pujunan	Nishinam	California			Ha	Men.
95	Salishan	Chehalis	Washington				Women.
96	do	Clallam	Port Gamble, Washington	F.C.M	19653		
97	do	Cowlitz					
98	do	Lkuñgen	Vancouver Island, British Columbia.			Smētalē	
99	do	Lummi	Washington				
100	do	Nisqually	do				
101	do	Nslakyapamuk	British Columbia	A.M.N.H		Méh-ta-la	Do.
102	do	Puyallup	Washington		16/993		
103	do	Queniut	do				
104	do	Shooswap	British Columbia				
105	do	Skagit	Washington				
106	do	Snohomish	do				
107	do	Soke	British Columbia				
108	do	Twana	Washington				
109	do		Tulalip Agency, Washington.	U.S.N.M	130990		Do.

110	Shahaptian	Klikitat	Washington	M.A.U.P	20955		Do.
111	Shoshonean	Comanche	Indian Territory	U.S.N.M	152911*a*		Do.
112	do	do	do	do	152911*b*		Do.
113	do	Paiute	Utah	P.M.A.A. and E	9411		
114	do	do	Nevada	U.S.N.M	19054		Do.
115	do	Shoshoni	Fort Hall, Idaho	do	22285		
116	do	Umkaret	Arizona	do	11217		
117	Siouan	Assinaboin	Dakota	do	8498		
118	do	Dakota	South Dakota	do	153365	Kansu kute	Do.
119	do	do				Kun-tah-so	
120	do	Dakota (Brulé)	South Dakota	M.A.U.P	10442 10443 16552		
121	do	Dakota (Sisseton)	Dakota				Men. Women.
122	do	Dakota (Yankton)	do	U.S.N.M	23556		
123	do	Gros Ventres	do	do	8425		Do.
124	do	Iowa	Iowa			Kon-tho-gra	Do.
125	do	Mandan	North Dakota	U.S.N.M	8427		
126	do	Omaha	Nebraska			Nan'-si ki de	
127	Tañoan	Tewa	Isleta			Pa tol	
128	do	do	Santa Clara	U.S.N.M	176707	Tu-gi-e-ple	
129	do	do	San Ildefonso				
130	do	do	Taos	M.A.U.P	20123	Ca-se-he-a-pa-na	
131	do	do	Tesuque				
132	Wakashan	Kwakiutl	British Columbia	F.C.M		Eibayu	
133	do	Makah	Neah Bay, Washington	U.S.N.M	23351		Do.
134	Yuman	Cocopa		do	76165		
135	do	Havasupai	Arizona			Hue-ta-quee-che-ka	Do.
136	do	Mohave	do	U.S.N.M	10334		Do.
137	do	do	Southern California	do	24166		
138	Zuñian	Zuñi	New Mexico	do	69355	Ta'-sho'-li-we	Men. Women
139	do	do	do	do	69352	do	Do.
140	do	do	do	do	69284	do	Do.

American Indian stave and dice games—Continued.

	Linguistic stock.	Tribe.	Place.	Museum.	Museum No.	Name.	Played by—
141	Zuñian	Zuñi	New Mexico	U.S.N.M.	69285	Ta'-sho'-li-we	Men. Women.
142	do	do	do	do	69004	do	Do.
143	do	do	do	do	69354	do	
144	do	do	do	do	69340	do	Do.
145	do	do	do	do	69287	do	Do.
146	do	do	do	do	69281	do	Do.
147	do	do	do	do	69003	do	Do.
148	do	do	do	M.A.U.P	16531	Tem-thla-nah-na-sho'-li-we	Men.
149	do	do	do	do	20031	Sho'-li-we	Do.
150	do	do	do	U.S.N.M.	69289	do	
151	do	do	do				
152	do	do	do	U.S.N.M.	69277	Sho'-li-we	Do.
153	do	do	do	do	69278	do	Do.
154	do	do	do	do		Thlatl-pa-tsi-we	
155		Yaque	Sinaloa, Mexico			Ké-zu-te	

American Indian stave and dice games—Continued.

	Implements.											
	For determining number.					For counting.						
						Circuit.				Counters.		
	Objects.	Number.	Material.	Length. Diameter.*	How used.	Material.	Form.	Size.	Number of divisions.	Material.	Number.	Collector.
1	Diamond-shaped and rectangular blocks.	5	Bone	¾ and 1⅞	In basket					Sticks		James Mooney.
2	Diamond-shaped blocks	5	do	1⅜	do							H. R. Voth.
3	Oval blocks	5	Wood	1⅜	do							Do.
4	Round and diamond-shaped blocks.	5	Bone		do					Sticks		James Mooney.
5	Plum stones	5			do					do	8	George Bird Grinnell.
6	Miscellaneous objects	13	9 bone; 4 brass.		In bowl							Henry R. Schoolcraft.
7	Beans				do							J. Long.
8	Plum stones											J. Hammond Trumbull.
9		5	Bone		In tray (bowl)							W. Wood.
10	Disks	8	Horn	*¾	In bowl					Twigs	40	Walter J. Hoffman.
11	do	6	Bone	*⅞	do					Splints	51 + 4	Stansbury Hager.
12	do	6	do	*1¾	On ground							Do.
13	do	6	do	*1	In bowl					Splints	48 + 4	George E. Starr.
14	do	5	Antler	*¾ to ⅞	do						48 + 4	
15	do	6	do	*¾ to ⅞	do						50 + 4	G. M. West.
16	Plum stones				In tray							Roger Williams.
17	do	5										J. A. Cuoq.
18	Disks	8			In bowl							S. Rasles.
19	Plum stones	7			do							Peter Jones.
20		Not less than 9.	Wood, bone, or brass.		do							John Tanner.

American Indian stave and dice games—Continued.

	Implements.											
	For determining number.				For counting.							
					Circuit.				Counters.			
	Objects.	Number.	Material.	Length. Diameter.*	How used.	Material.	Form.	Size.	Number of divisions.	Material.	Number.	Collector.
21	Disks	6	Bone	*$\frac{3}{4}$	In bowl					Splints	48 + 5	Mrs. W. W. Brown.
22	do	8	do		Thrown on blanket.					do		Do.
23	do	6	do		In bowl					do	51 + 4	Joseph Nicolar.
24	do	6	do		do					do	48 + 4	F. H. Cushing.
25	Cubes		Wood		do							Edward F. Wilson.
26	Staves	4	Bone		Scattered on ground.					Sticks	12	George Bird Grinnell.
27	do	4	do	$5\frac{1}{4}$						do	12	George A. Dorsey.
28	do	3	do	$6\frac{3}{8}$								Do.
29	Staves	3	Hazel	8	Struck on stone.	Stones	Square		40			Edward Palmer.
30	do	3	Ash	$9\frac{1}{4}$	do	do	Circle		40			C. N. B. Macauley.
31	do	3	Cottonwood	8								Edward Palmer.
32	Blocks	7		$\frac{3}{4}$								Washington Matthews.
33	Staves	3			Thrown on stone.	Stones	Square					Do.
34	do	13			Thrown upward.							Do.
35	do	3			Struck on stone.	Stones	Circle		40			Stewart Culin.
36	Plum stones	8		*$1\frac{1}{16}$	In basket							Dr. Gray and Matthew F. Stevenson.
37	Pebbles	5			do							H. M. Brackenridge.

38	Plum stones	5			In basket					Sticks		George Bird Grinnell.
39					In bowl							Z. M. Pike.
40	Carved birds		Ivory									Benjamin Sharp.
41	Carved ducks		do									Charles Francis Hall.
42	Beans	6			In basket					Beans	12	Mrs. Starr Hayes.
43	Plum stones				In bowl							G. H. Loskiel.
44	do	6			do							J. Brebeuf.
45		6 or 8	Bone		do							P. de Charlevoix.
46	Plum stones				do							J. Lalemant.
47	do	6			do							Nicolas Perrott.
48	do	8			On blanket							Do.
49	do	5 or 6			In bowl							Sagard Theodat.
50	do	5 or 6			On skin							Do.
51	do				In bowl							Col. James Smith.
52	do				do							G. H. Loskiel.
53					do							Jacques Bruyas.
54	Fruit stones				Thrown with hand.							Do.
55	Disks	8	Bone or stone		do					Beans	100–300	W. M. Beauchamp.
56	Peach stones	6			In bowl					do		Do.
57	Disks	8	Elk horn		Tossed on blanket.					do	*Ca.* 50	L. H. Morgan.
58	Peach stones	6			In bowl					do	100	Do.
59	Disks				do							J. N. B. Hewitt.
60	Peach stones				do							Do.
61												Do.
62	Staves											Charles F. Lummis.
63	do											Do.
64	do	3	Wood	4	Struck on stone.	Pebbles	Circle					George H. Pradt.
65	do											Charles F. Lummis.
66	Blocks	4	Wood		Struck on stone.	Pebbles	Square		40			Mrs. M. C. Stevenson.
67	Staves	4			do	Cotton cloth			40	Sticks	8	H. L. Scott.
68	do	4	Willow	7	do	Blanket			40	do		James Mooney.

American Indian stave and dice games—Continued.

	Implements.											
	For determining number.					For counting.						
						Circuit.				Counters.		
	Objects.	Number.	Material.	Length. Diameter.*	How used.	Material.	Form.	Size.	Number of divisions.	Material.	Number.	Collector.
69	Staves	4	Alder	$5\frac{1}{8}$	Struck on stone.	Blanket	Square		40	Sticks		James Mooney.
70	do	4	Willow or chestnut.	$8\frac{3}{4}$	do	do	do		40	do		Do.
71	do	4	Elm	$8\frac{7}{8}$	do	do	do		40	do		Do.
72	do	4		$5\frac{13}{16}$	do	do	do		40	do		Do.
73	do	4		$4\frac{3}{4}$	do	do	do		40	do		Do.
74	do	4		$5\frac{3}{8}$	do	do	do		40	do		Do.
75	"Die"	1	Ivory	1	On leather tablet.							George T. Emmons.
76	do	1	Wood		do							Do.
77	do	1	Ivory	1	do							Do.
78	do	1	Wood	$1\frac{1}{2}$	do							Do.
79	do	1	Ivory	$\frac{15}{16}$	do							Do.
80	Woodchuck teeth	4		$1\frac{1}{4}$ to $1\frac{3}{4}$								L. S. Dyer.
81	Beaver teeth	4			Drop on stone.					Sticks	12	A. S. Gatschet.
82	Walnut shells	8		×1	In basket					do	15	Stephen Powers.
83	Staves	3	Split cane	8 to 9	Struck from hand.							Le Page du Pratz.
84	do	4	Cactus	$9\frac{1}{4}$	Struck on stone.	Holes in ground.	Rectangle.	12 by 8 feet				W J McGee.
85	do	4	Willow	9								Mrs. G. Stout.

86	Staves	4	Willow	8⅜							Do.
87	do	4	Hazel	7¼		Holes in ground.	Rectangle.	10 feet square			Edward Palmer.
88	do	4		7⅜	Thrown on ground.						Do.
89	do	4	Reed	6	Thrown on stone.	Holes in rock	Rectangle.	3 by 4 feet			Carl Lumholtz.
90	do	4	Ash	18½	do	do	do	do			Do.
91	do	4	do	16¾	do	do	do	do			Do.
92	do	4	Hickory	11½ to 13½	do	do	do	do			Do.
93	do	4	Piñon	6½	do	do	do	do			Do.
94	Split acorns	4			Into basket						Stephen Powers.
95	Beaver teeth	4									Myron Eells.
96	do	4									Do.
97	do	4									Do.
98	do	4							Sticks	30 or 40	Franz Boas.
99	do	4									Myron Eells.
100	do	4									George Gibbs.
101	do	4									James Teit.
102	do	4									Myron Eells.
103	do	4									Do.
104	do	4									Franz Boas.
105	do	4									Myron Eells.
106	do	4									Do.
107	do	4									Do.
108	do	4									Do.
109	do	4		1⅞ to 2					Radial bones of birds.	28	E. C. Cherouse.
110	do	3 (4)									A. B Averill.
111	Discoids	6	Bone	1¼ to 1¾	In basket						James Mooney.
112	do	6	do	1½ to 1¾	do						Do.
113	Staves	14	Reed	5⅝							Edward Palmer.
114	do	12	Greasewood	2¾							Stephen Powers.

American Indian stave and dice games—Continued.

	Implements.												
	For determining number.					For counting.							
						Circuit.				Counters.			
	Objects.	Number.	Material.	Length. Diameter.*	How used.	Material.	Form.	Size.	Number of divisions.	Material.	Number.	Collector.
115	Staves	4	Pine	10								William H. Danilson.
116	Tablets	10?	Cedar bark	5 to 10	Shaken under blanket					Sticks		J. W. Powell.
117	Staves	4	Hickory	15½								J. P. Kimball.
118	Plum stones	6 or 7	Plum stones		In bowl or basket.					Sticks, stone, corn.	32	Z. T. Daniel.
119	do	8	do		In bowl							Henry N. Schoolcraft.
120	do		do		In basket					Sticks	32	Horatio N. Rust.
121	do	7 or 8	do									Charles E. McChesney.
122	do	4	do									Paul Beckwith.
123	Staves	4	Bone	8½	On blanket							Washington Matthews.
124	Blocks		Wood		From bowl							George Catlin.
125	Disks	5	Bone	1 to 1½*	In basket							Washington Matthews.
126	Plum stones	5	Plum stones		In bowl					Sticks		J. Owen Dorsey.
127	Staves	3		5	Thrown on stone.	Stones	Circular	3 feet	40			Charles F. Lummis.
128	do	3		5¼	do	Corn or stones	Square		40			T. S. Dozier.
129	do											Charles F. Lummis.
130	do	3		4¼	Dropped on stone.	Stones	Circular	2 or 3 feet	160			T. P. Martin.
131	do											Charles F. Lummis.
132	Dice		Wood									Franz Boas.
133	Beaver teeth	4		2–2⅛								J. G. Swan.

134	Staves	4	Willow	8							Edward Palmer.
135	do	3			On stone	Stones	Circle				G. Wharton James
136	Blocks	4	Willow	6½							Edward Palmer.
137	do	4	do	6							Do.
138	Staves	3	Piñon	5½	Struck on stone.	Circle of stones.	Circular		40	Beans or corn.	James Stevenson.
139	do	3	do	5½	do	do	do		40	do	Do.
140	do	3	do	5½	do	do	do		40	do	Do.
141	do	3	Larch	5¾	do	do	do		40	do	Do.
142	do	3	Piñon	3¾	do	do	do		40	do	Do.
143	do	3	do	5½	do	do	do		40	do	Do.
144	do	3	do	6	do	do	do		40	do	Do.
145	do	3	White pine	4	do	do	do		40	do	Do.
146	do	3	Yellow pine	5½	do	do	do		40	do	Do.
147	do	3	Bass	4⅜	do	do	do		40	do	Do.
148	do	3	Piñon	4	do	do	do		40	do	F. H. Cushing.
149	do	4	Reed	5⅜	Tossed upward against skin stretched over basket.						Do.
150	do	4	do	7¾							James Stevenson.
151	do	4	do	7							
152	do	4	do	6½							Do.
153	do	4	do	6							James Stevenson.
154	Blocks	3	Wood		In basket						F. H. Cushing.
155	Staves	4	Reed								C. V. Hartman.

In the summer of 1896, Dr. J. Walter Fewkes, while engaged in explorations for the Bureau of American Ethnology, found several ancient split reeds marked in a similar manner to those used in the Zuñi game of *Sho'-li-we*. These reeds, represented in plate 15, were dug up by him at the Cherlon ruin, near where the Cherlon Fork empties into the Little Colorado, about 15 miles east of Winslow, Arizona. He writes:

I have no means of knowing how old Cherlon ruin is, but very old—no white man's objects were unearthed there. There were settlements in the vicinity as late as 1700. This may have been one, but I judge from the ruin and legends that it was much older. The ruin of Cherlon, like many on the banks of the Little Colorado, shows resemblances to ruins on Zuñi River, and no doubt has relations with them. The Southern Hopi clans claim them, and I fancy both Zuñi and Moki are related to the clans of Cakwabayû, "Blue Running Water House."

I am indebted to Mr. Wells M. Sawyer, of the Bureau of American Ethnology, for the careful drawing (Plate 15) showing the marks on the reeds. One reed is apparently without marks on the exterior, and of the four others two have the same marks, from which the writer infers that they form part of at least two original sets. During the same

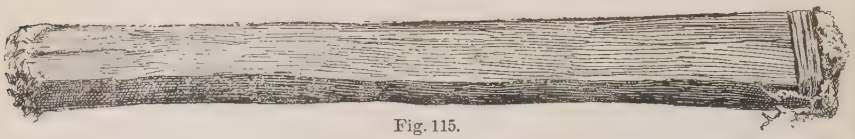


Fig. 115.

STAVE FOR GAME.

Length, 7 inches.

Cliff dwellings of Mancos Canyon, Colorado.

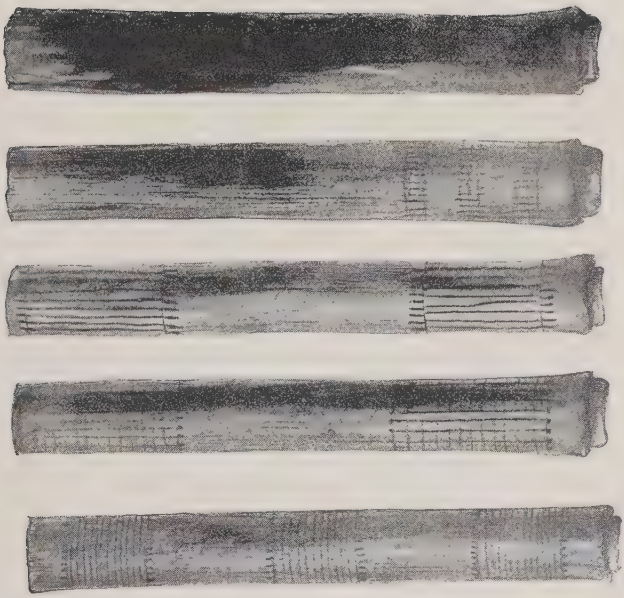
Museum of Archæology, University of Pennsylvania.

season's work, Dr. Fewkes excavated a bowl (Cat. No. 157735, U.S.N.M.) from the old ruin of Cuñopavi containing a symbolic pictograph of a bird, and a representation of the four reed or stave casts (Plate 16). This bowl was dug up from the old cemetery. Old Cuñopavi, or Shimopavi, as it is commonly written, he informs me, was inhabited in 1540, and the people moved to the present site about the end of the seventeenth century. "The bowl is of the same ware as the prehistoric pottery of Tusayan, and I think it older than 1540, but that is not proven. The bird is Kwataka, 'Eagle Man,'[1] an old crony of gamblers."

Additional evidence of the antiquity of the stave game in North America is afforded by a prehistoric stave of cotton wood (fig. 115), (Mus. Arch., Univ. Penn.), tied at one end with sinew to prevent its splitting, and practically identical with the Navajo staves of cotton wood (Cat. No. 9557, U.S.N.M.), which was found by the Wetherill Brothers in a prehistoric Cliff dwelling in Mancos Canyon, Colorado.

In ancient Mexico, among the cultivated Aztecs, we find mention of the "game of the canes" under the names of *cauallopan* and *nemimina-*

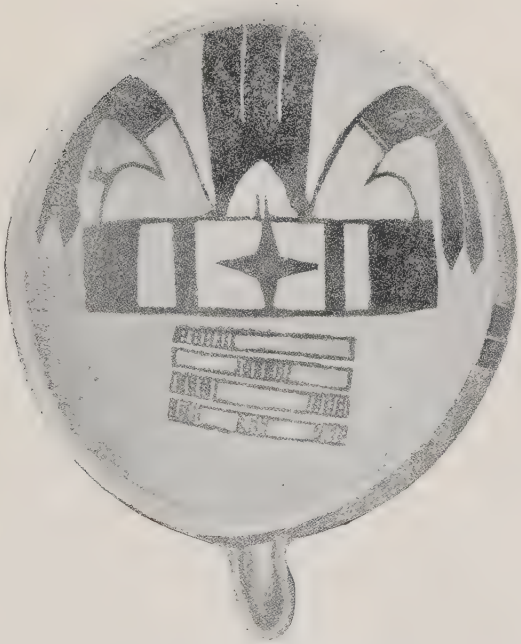
[1] Identified by Mr. Cushing with *Mi-si-na* referred to in his account of *Sho'-li-we*.



GAMBLING REEDS.
(Restored.)

Cherlon ruin, Arizona.

Cat. No. 158030, U.S.N.M. Collected by Dr. J. Walter Fewkes.



DECORATED POTTERY BOWL WITH "EAGLE MAN" AND GAMING-REED CASTS.

Cuñopavi.

Cat. No. 157735, U.S.N.M. Collected by Dr. J. Walter Fewkes.

liztli in Molina's dictionary. Dr. Brinton informs me that the combination *cauallopan nemiminaliztli* is defined by R. Simeon, in his *Dictionnaire de la langue Nauhuatl*, as "playing with horses." Again Molino gives *neyayaotlaliztli* = "juego de canas, o escaramuça" (skirmish) and juegos de pelea (war) = *neyayaotlaliztli*.

A reference to the cane game is to be found in Torquemada.[1] Speaking of the ceremonies in honor of Tlaloc[2] he says:

The day on which they held feast to these gods was in the sixth month, which corresponds to our June. On this day they cleansed all cisterns and water conduits and played with green maize stalks.

Again, in the "Hymn of Tlaloc"[3] occurs the passage:

In Tlalocan, in the verdant house, they play at ball, they cast the reeds.

Duran[4] (somewhat confusedly) describes a game with tossed canes as follows:

There was another game, which was that they made on a plaster floor little hollows after the manner of a *fortuna* (wheel of fortune?), and one took ten pebbles and the other ten others, and the one placing his pebbles on the one edge and the other on the other on contrary sides, and taking some reeds split down the middle they threw them on the ground so that they sprang up, and as many reeds as fell with the hollow side upward so many "houses" he moved his pebbles forward, and thus one such followed the other, and all pebbles as he overtook, he went on taking away until he left his adversary without any.[5] (The meaning of the clause that follows is not clear.)

The game of *Patolli* (No. 39) by which we now generally understand the game played with marked beans instead of canes or staves, upon a cross shaped diagram, is probably a derived form of the cane game, the use of beans being paralleled at the present day among the Cherokee (see p. 720). The word was a general name for games and was also applied to the "dice," by which they were counted. Ribas uses it in that sense in the account which follows, referring to the Indians of Sinaloa:

The game that they call *of the Patolli* is very common among them and corresponds to that of cards or dice, because in place of them they use certain four small

[1] Monarchia Indiana, II, p. 147.

[2] The deity who presided over the waters, the rains, the thunder, and the lightning. The annual festival in his honor took place about the time of the corn planting, and was intended to secure his favor for this all-important crop. Rig Veda Americanus, Daniel G. Brinton, Philadelphia, 1890, p. 25.

[3] Rig Veda Americanus, p. 24.

[4] Diego Duran, Historia de las Indias, III, Cap. XXII. A translation is given by Tylor. On American Lot Games, p. 8.

[5] Había otro juego que era que hacían encima de un encalado unos oyos pequeñitos á manera de fortuna y el uno tomaba diez piedras y el otro otras diez y el uno ponía sus piedras por la una acera y el otro por la otra en contrarias partes e con unas cañuelas hendidas por medio daban en el suelo y saltaban en alto y tantas cuantas cañuelas caían lo güeco hácia arriba tantas casas adelantaba sus piedras y así seguían el uno al otro y todas cuantas chinas le alcanzaba se las iba quitando hasta dejalle sin ninguna y acontecía habelle quitado cinco y seis y con las cuatro que le quedaban decirle tambien las cañuelas que revolvía sobre el otro y ganalle el juego.

canes, scratched, less in length than a span, and upon these they have certain small figures and points which give them their value or loss. When they play they throw these down, casting them upon a small stone in order that they may rebound and fall with their points at random, and he who plays wins or loses, marking on the earth the points which gain until the number is reached of the wager which those present have made. This wager is of beads of shells of the sea which they esteem and with which they adorn themselves. Wagers are also made of bows, or arrows, or knives, articles they obtain; and of the same character are their wagers in other games. [1]

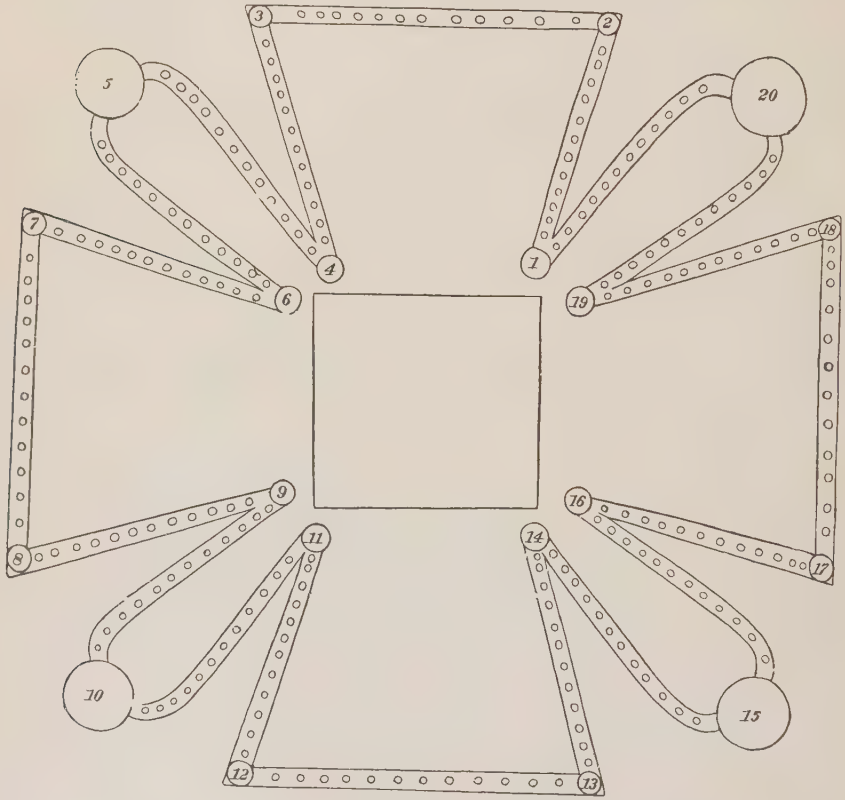


Fig. 116.

SCHEME OF PLATE 44, FÉJÉRVARY CODEX.

After Cyrus Thomas.

[1] El juego que llaman del Patoli es muy general en ellos, y corresponde al de los naipes o dados. Porque en lugar dellos usan de unas quatro cañitas cortas, rajadas, menores de un geme, y en ellas tienen unas figurillas y puntos, que les da el valor, ó pérdida. Estas quando juegan las botan, arrojándolas sobre una pedrecita, para que salten, y caigan los puntos á su ventura, y gane, o pierda el que las juega, rayando en la tierra los puntos que ganan, hasta cumplir el número de la apuesta, que se hazen allí presente. Esta es de sartas de caracolillos de mar que ellos estiman, y con que se adornan. Tambien sirve de posta, arcos o flechas, cuchillos, o achuelas que alcansan: y de lo mismo suelen ser las apuestas de otros juegos.

Perez de Ribas, Historia de los Triumphos, Lib. 1, Cap. IV, Madrid, 1645.

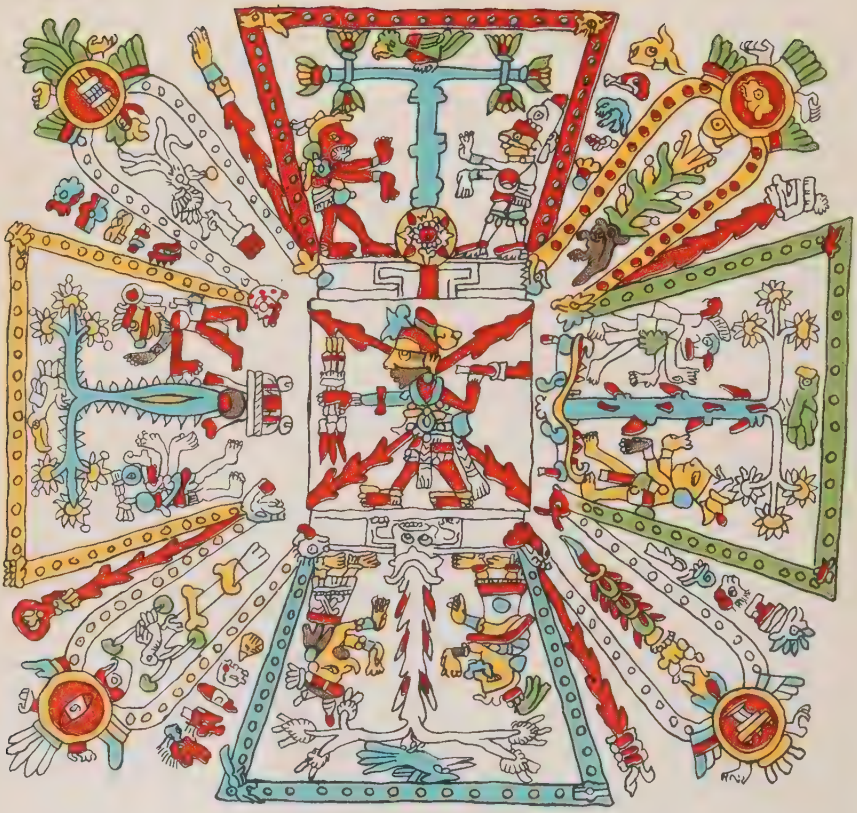


PLATE 44, FEJERVARY CODEX.

In searching for remains of the cane game in old Mexico, the writer was deeply impressed with the many points of resemblance between the gaming circuit as described by Mr. Cushing as used in *Sho'-li-we*, and some of the diagrammatic paintings in the codices, leading him to the conclusion that the purpose of the latter was identical. As an illustration, the figure from the Fejérvary codex (Plate 17) may be regarded as a divinatory, calendrical counting circuit, the forty beans or corn of four colors of the Zuñi *Sho'-li-we* having their counterparts in the four colored arms of the cross—red, yellow, blue, and green—marked with small circles. Again the entire design of the Mexican figure will be seen to represent an animal or the hide of an animal, comparable with the buffalo hide of the Zuñi game. In the center of the Mexican

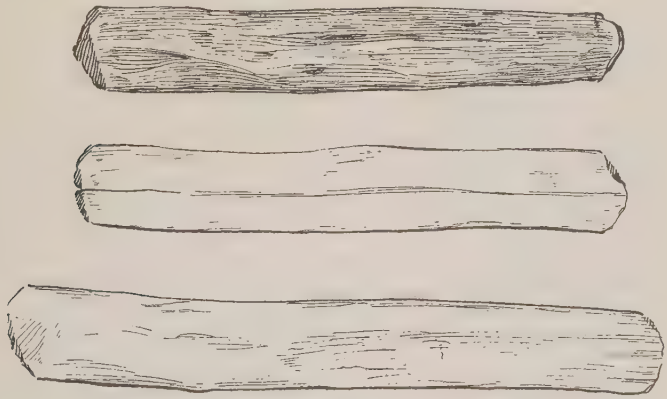


Fig. 117.

SET OF STICKS FOR GAME.

Lengths, 3¼ and 3⅞ inches.

Toba Indians, Grand Chaco, South America.

Cat. No. 1799, Field Columbian Museum. Hassler collection.

picture is a figure of a warrior god or priest, armed with *atlatl* and darts, corresponding to the cross, symbolic of the twin war god of the Zuñi circuit. The scheme of the plate from Prof. Cyrus Thomas's Notes on certain Maya and Mexican Manuscripts[1] is added (fig. 116) to facilitate comparison.

From South America the following sets of implements have been collected:

TOBA TRIBE, CHACO INDIANS. Cat. No. 1799, Field Columbian Museum, Chicago. Hassler collection.

Three sticks roughly whittled from small twigs (fig. 117). Two of them 3¼ inches in length, ½ inch wide, and about ⅛ inch thick, slightly rounded on one side, which is blackened, while the other is flat and

[1] Third Annual Report Bureau of Ethnology.

plain. The third stick is about 3⅞ inches in length, made of another wood, and possibly belongs to another set. Collected by Dr. Emil Hassler. Dr. Hassler informed the writer that they are tossed in the air and if three round sides fall uppermost they gain. "The sticks must fall parallel."

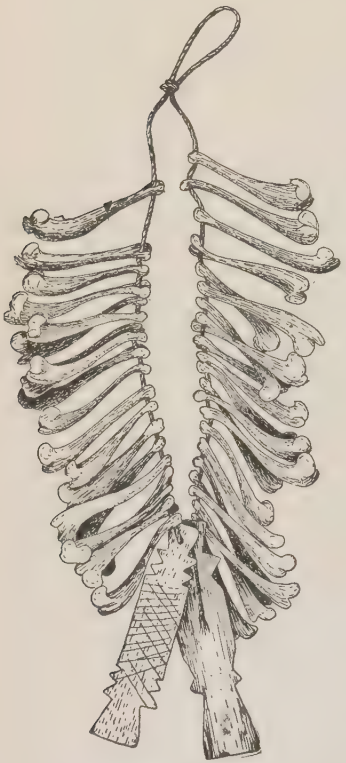


Fig. 118.
PAIR OF BONES AND COUNTERS FOR GAME.
Grand Chaco Indians.
Field Columbian Museum. Hassler collection.

Referring to the Toba, Cardus[1] says:

> Their principal game consists in raising and letting fall to the ground some small pieces of split reed with much shouting; the object of the shouting, on one side, that the pieces may fall well, and on the other that they may fall badly. The stakes are usually a horse, a cow, a slave, a sheep, or a poncho.

Another set of similar gambling instruments from the Indians of the Grand Chaco are represented in fig. 118. They were exhibited by Dr. Hassler in his collection at the Columbian Exposition, but unfortunately can not now be found in the Field Columbian Museum, to which the collection was transferred. The two large bones are tossed, their falls determining the count, which is recorded by means of the small radial bones that are strung upon the cord. The men who play this game carry the implements suspended from their wrist.[2] The games above described led the writer to make a particularly careful search for objects that might have served for gaming implements in collections from ancient Peru. In the collection made by Dr. Max Uhle, at Pachacamac, for the University of Pennsylvania, now in its Museum, are a number of narrow, flat tablets of hard wood that might possibly have been used as gaming staves. The same conjecture might be hazarded with reference to six slips of cane (Cat. No. 28393) found together on a mummy in the first cemetery. These slips, which are 4 inches in length by about ½ inch in width, are wound with colored thread, black, yellow,

[1] Las Misiones Franciscanas entre los infideles de Bolivia por el R. P. Fr. José Cardus, Barcelona, 1886, p. 263.

[2] I find the following reference to games of this type among the South American Indians: Molina (History of Chili, II, p. 9), in describing the games of the Araucanians, says, "the game of *quechu*, which they esteem highly, has a great affinity to that of backgammon, but instead of dice they make use of triangular pieces of bone marked with points, which they throw with a little hoop or circle supported by two pegs, as was probably the *fritillus* of the ancient Romans."

and red, in bands of varying width. The arrangement of the colors varies on each of the six slips.

William Bollaert[1] describes a game of the Aymara Indians under the name of *pasa.*

It is one of great antiquity, and seems to be the only one of this sort. *Pasa* means a hundred, as he wins who first gets that number. They play it with two instruments, one a spread eagle of wood with ten holes on each side, being tens, and are marked with pegs to denote every man's gettings; the other is a bone in the manner of a die, cut with seven faces, one of which has a particular mark called *guayaro* (*huyaru*). The other five tell according to the number of them, and the last is a blank. The way of playing is to toss up the bone, and the marks on the upper surface are so many got. But the *guayro* goes for ten, and the like number is lost if the blank side appears.[2]

Von Tschudi[3] describes the following game:

Pitška, a game with small sticks which were marked with stripes of different colors. It was generally played during the night of the death watch. Villagomez believes that its name is derived from *Pitska,* the number "five" because of the five fast days following the night of the death watch, a view which I do not accept. Holguin mentions the game *Pitška,* and refers to Pitskana as a six-sided piece of wood or small stick with which the game is played, only we do not know how it was done but probably in a similar way to the game of dice. In Aymara its name is also *Phiska.*

4. Tab. Cairo, Egypt.

Board, staves,[4] and men. A game played upon a board divided into rows of squares, with pieces or men, which are moved according to the throws with four staves (fig. 119).

The board, called a *seegà* (fig. 120), is divided into four rows of squares called *beyts* (houses) each about 2 inches wide, or it consists of similar rows of holes made in the ground or in a flat stone. The *beyts* are usually seven, nine, eleven, thirteen, or fifteen in each row. In each *beyt* of one exterior row is placed a little piece of stone or dingy brick about the size of a walnut, and in each *beyt* of the other exterior row a piece of red brick or tile, or sometimes pieces are placed in only

[1] Antiquarian, Ethnological and other Researches in New Granada, Equador, Peru, and Chili, London, 1860, p. 168.

[2] Referring to the above account, Dr. Brinton tells me that the exact form, *pasa,* as a numeral, does not appear to prevail in Aymara or Quichua. In Aymara we have:

paa or *paya* = 2 or twice
pusi = 4
pataca = 100

In Quichua:

pussac = 8
pachac = 100

"I do not find *guayaro* or *huyaru* in either tongue, although there are a number of words close to them."

[3] Zeiträge zur Kentniss des alten Peru, Wein, 1891, p. 217.

[4] Cat. No. 16896, Mus. Arch., Univ. Penn. Made in Streets of Cairo, Columbian Exposition, Chicago, 1893.

a certain number of *beyts* in those rows, as for instance in the first four. The pieces of one row must be distinguished from those in the other.

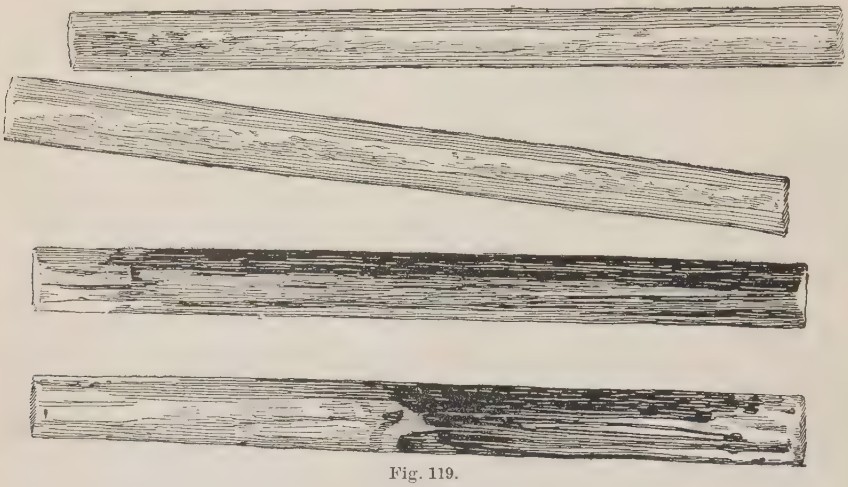


Fig. 119.

CANES FOR TÁB.

Length, 8 inches.

Cairo, Egypt.

Cat. No. 16896, Museum of Archæology, University of Pennsylvania.

They are called *kiláb*, or "dogs;" in the singular, *kelb*. The game is generally played by two persons. The four sticks consist of pieces of palm branch, about 8 inches in length, one side of which, being cut flat

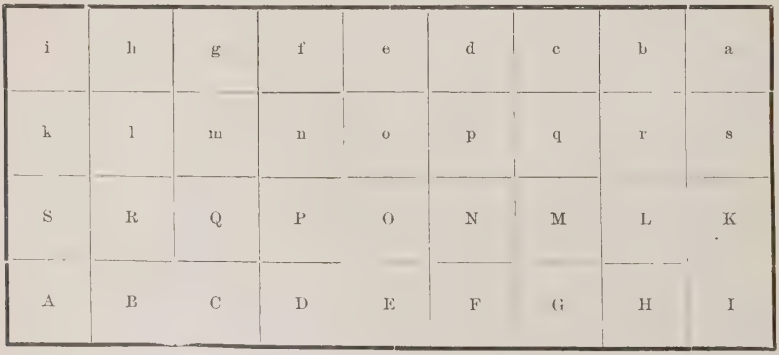


Fig. 120.

BOARD (*seegá*) FOR TÁB.

Egypt.

From Lane.

and smooth, is white; the other green, or, if not fresh, of a dull yellow color; the former side is commonly called white and the other black. The four sticks are thrown, all together, against a stick thrust into the

ground or against a wall, or against a stick inclined against a wall. The throws count as follows:

1 white side up, called *táb*, or *weled*, "child" = 1.
2 white sides up = 2.
3 white sides up = 3.
4 white sides up = 4.
4 black sides up = 6.
A throw of 4 or 6 entitles the player to throw again.[1]

The name of the board in this game, *seeyà*, appears to be an Arabacized form of the Indian word *saj*, "teak." According to native lexicographers it is applied to wood, black and heavy and made in pieces of oblong form or squared, brought from India. In the sense of board it was originally applied to the tablet made of *saj* wood. The name given to the men, "dogs," is the same as that applied to the men in the game of *Kawade kelia* (No. 37) in Ceylon. These facts would seem to

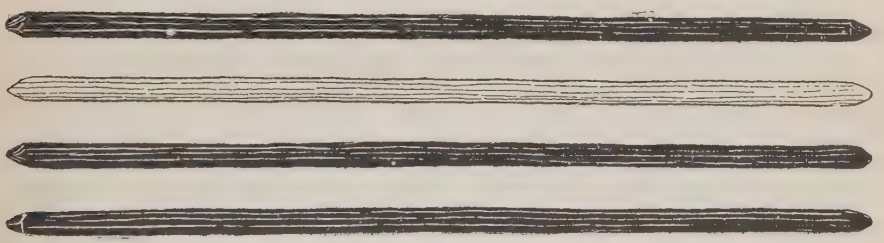


Fig. 121.
CANES FOR GAME.
Length, 8¼ inches.
Singapore, Straits Settlements.
Cat. No. 175222, U.S.N.M.

indicate an Asiatic origin for the game of *Táb*. According to Dr. Hyde it was known to the Persians under the name of *Bazi kamish*, that is, the "Reed game."

The following game, No. 5, from Singapore, affords an illustration of its wide distribution in Asia:

5. GAME STICKS.[2] Singapore, Straits Settlements.

Set of four bamboo staves about 8¼ inches in length, painted black with Chinese ink on one side (fig. 121). Evidently intended for a game like *Táb*.

In closing this account of the use of the tossed staves in divination and gambling in the Old World it is fitting to mention the references to similar customs by the classical authors. Thus Tacitus[3] describes the Germans as "cutting a twig from a fruit[4] tree and dividing it into

[1] For a further account of the method of play, consult Edward William Lane, Manners and Customs of the Modern Egyptians, II, p. 49.

[2] (Cat. No. 175222, U.S.N.M.) Collected by Hon. Rounsevelle Wildman, U. S. Consul-General, Singapore.

[3] Germania, X.

[4] Dr. O. Schrader, "Oak, beech," Prehistoric Antiquities of the Aryan Peoples, London, 1890, p. 279.

small pieces, which, distinguished by certain marks, are thrown promiscuously upon a white garment. Then the priest of the canton, if the occasion be public (if private, the master of the family), after an invocation of the gods, with his eyes lifted up to heaven, thrice takes out each piece, and, as they come up, interprets their signification according to the marks fixed upon them. If the result prove unfavorable, there is no more consultation upon the same affair that day; if propitious, a consultation by omens is still required."

More closely resembling the practices described in the text is the German method of divination as related by Saxo-Grammaticus[1] of the inhabitants of the Isle of Rugen, in the Baltic Sea:

Throwing, by way of lots, three pieces of wood, white in one part and black in another, into their laps, they foretold good fortune by the coming up of the white; bad by that of the black.

Fig. 122.

BARESMA.

Length, 5 inches.

From drawing of originals in the possession of Prof. A. V. Williams Jackson.

The reference in Herodotus[2] to divination among the Scythians, in which large bundles of rods were used, seems to refer to the class of divinatory rites that will be treated in the second part of this paper.

Lenormand[3] states that the Magi foretold the future by throwing little sticks of tamarisk wood. The authority which he cites[4] makes no specific mention of any such performance, but merely says that the "Magi and Scythians prophesy with staves (*ligno*); and in many places prophesying they use twigs (*virgis*). Dinon says that the Median magi also prophesy by twigs (*virga*)." Dinon no doubt referred to the *baresma*, of which mention is also made by Strabo.[5]

The *baresma* (now called *barsom*) was a bundle of sacred twigs which the priest held in his hands while reciting the prayers (Plate 18). They were formerly twigs of the pomegranate, date, or tamarind tree, or any tree that had no thorns, and were plucked with peculiar ceremonies which alone made them fit to be used for liturgic purposes.[6]

[1] Hist. Dan., XIV, p. 288.

[2] Volume IV, p. 67.

[3] Chaldean Magic, London, 1877, p. 237.

[4] Schol. Nicandr. Theriac, V, p. 613.

[5] "They (the Magi) continue their incantations * * * holding before the fire a bundle of rods," XV, Cap. 3.

[6] The Zend Avesta. Translated by James Darmsteter, Oxford, 1880. *Vendidâd*, III, Pt. 1, p. 22, note 2. The Parsis in India found it convenient to replace them with brass wires, which when once consecrated can be used for an indefinite period. (*Ibid.*)

Sacerdos cum Cingulo quadrimodi
Adnodum Reverendo in Christo Patri RICHARDO Dio: perm. Episcopo Petroburgensi hanc Tabulam Gratitudinis ergò lubens
meritiq; D D D. Autor T H.

MAGI WITH BARESMA.

From Hyde's Historia Religionis Veterum Persarum.

Lenormand declares that the *baresma* originated in a bundle of divining wands, such as were thrown in Chaldea and Babylonia. Madam Ragozin,[1] following the same line of comparison, points out the resemblance between the *baresma* (fig. 123) and a peculiar object (fig. 124) which frequently recurs deposited upon the altar in Assyrian scenes of worship and sacrifice. "The use of it, or the nature, has never yet been explained; but on close inspection it looks extremely like a bundle of twigs, uneven in number, tied together with a ribbon. Is it not likely that it may represent the sacred divining rods and be the original of the Avestan *baresma?*"

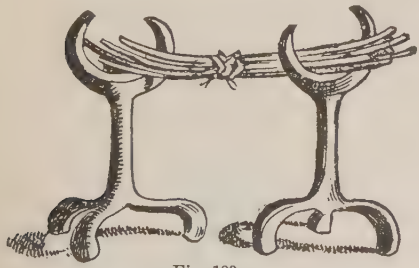


Fig. 123.

BARESMA (*barsom*) WITH STAND.

Modern Persia.

From drawing in the Story of Media, Babylon and Persia.

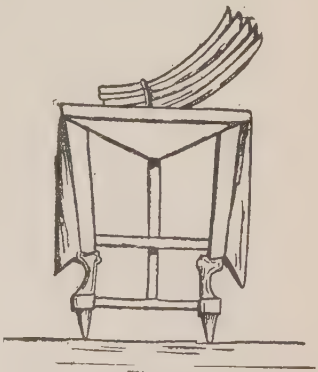


Fig. 124.

ASSYRIAN ALTAR.

Compare Baresma with stand, fig. 123.

From drawing in the Story of Media, Babylon and Persia.

In ancient China the nobles of the highest ranks carried scepters of jade stone,[2] the name of which, *kwei*, is written with a character, which compounded with the radical for "hand," stands for *kwá*, "to divine with straws," No. 65; and again, with *puk*, "to divine," written on the right, for the *kwá* or divinatory diagrams formed of unbroken and broken lines.[3] These diagrams may be regarded as representing the permutations of two-faced staves, three producing the trigrams (fig. 5),

I am indebted to Prof. A. V. Williams Jackson, of Columbia University, for an opportunity to examine a set of *baresma*, presented to him with a set of sacrificial implements by Mr. Dinshah Pestanji Framji Ghadiali. They consist of a bundle of forty-three bright brass wires 5 inches in length (fig. 122). In reply to my inquiry he writes that the number in this particular specimen is evidently a matter of chance, and he furnishes me with the following reference:

Haug's Essays on the Parsis, p. 397 (third edition, by E. W. West), says:

"The *barsom* consists of a number of slender rods or *tāi*, formerly twigs of some particular trees, but now thin metal wires are generally used. The number of these *tāi* depends upon the nature of the ceremony to be celebrated. For Ijashne (*yazishn*) alone 21 *tāi* are required; for Ijashne, with Vendidād and Visparad, 33 *tāi*; for Yasht-i Rapithwin 13 *tāi*; for Darūn Bāj 5 *tāi*, or 7 when a priest becomes a *herbad*."

[1] Zenaïde A. Ragozin, The Story of Media, Babylon, and Persia, New York, 1888, p. 149.

[2] The *kau púi* or divinations blocks (fig. 212), were originally made of stone.

[3] The Book of History states that in the first month (the time when divination was especially practiced) the Emperor collected the five kinds of scepters, and at the expiration of the month he gave them back to the various chiefs.

and six the hexagrams (fig. 4). These tablets, *kwai*, are figured in the imperial edition of the Chow Li, or "Ritual of the Chow Dynasty" (1122–255 B. C.), the pictures dating from the time of Chu Hi,[1] by whom they were added to the text in the Twelfth Century, A. D. Among them is the *ún kwai* (fig. 125 A), the *sun kwai* (fig. 125 B), and the *kung kwai* (fig. 125 C).

The first, the "pillar scepter" or tablet, was $\frac{9}{10}$ foot in length and carried by princes of the first rank (dukes). They were the grand

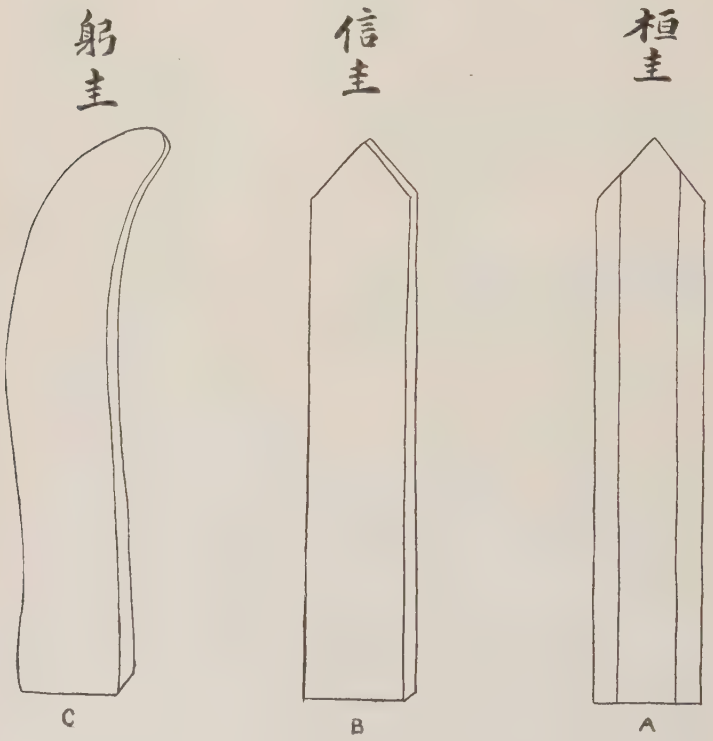


Fig. 125.

SCEPTERS (*kwai*) ANCIENTLY CARRIED BY CHINESE NOBLES.

From the Chow Li.

councilors of the Emperor and the descendants of the first two emperors. The two pillars or columns were the emblems of the palace, supporting it in the same manner as the princes support the Emperor. Perhaps the name, *ún kwai*, indicates that these tablets had two columns.[2] The second, the "straight scepter," was $\frac{7}{10}$ foot in length and carried by princes of the second rank (marquises). It probably represents the

[1] Chinese Reader's Manual, No. 79.

[2] Le Tcheou-li ou rites des Tcheou. Traduit par Édouard Biot, Paris, 1851, I, p. 431, note 7.

figure of a man standing erect.[1] The third, the "bent scepter," was also $\frac{7}{10}$ foot in length and was carried by princes of the third rank (earls). It is explained as probably representing the figure of a man bending over.[1] The Emperor himself had a jade scepter, *tái kwai* (fig. 126), "grand tablet," so called from its size, it being 3 feet in length.

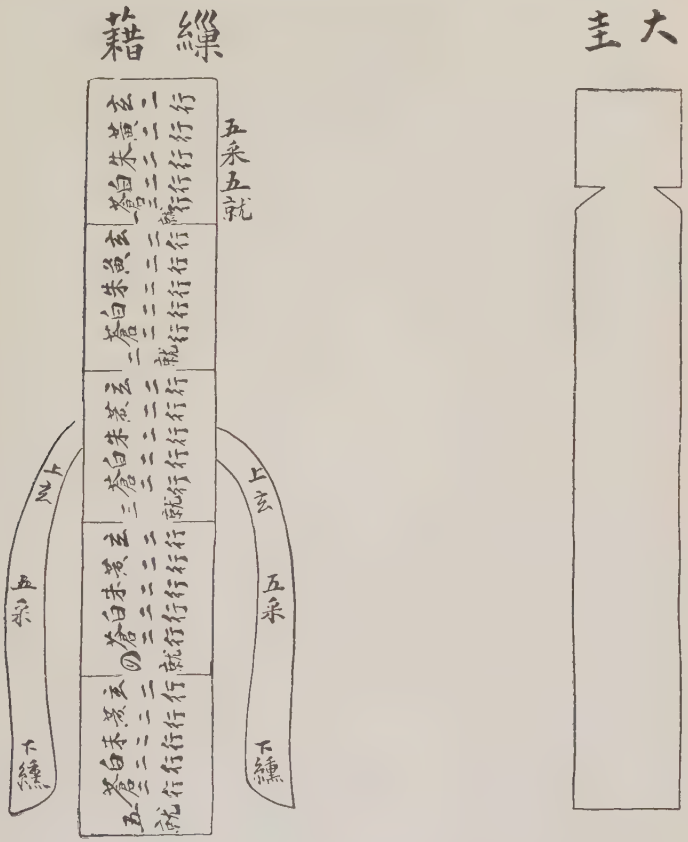


Fig. 126.

GRAND SCEPTER (*Tái kwai*) ANCIENTLY CARRIED BY THE EMPEROR.

China.

From the Chow Li.

It became smaller at the top and its head is in the shape of a hammer. This the Emperor wore between his robe and his girdle.[2]

In addition he held another scepter called the *chan kwai* or scepter of omnipotence (fig. 127). It was $1\frac{2}{10}$ feet in length. The word *chan* not only signifies omnipotence, but is also the name given to the four protecting mountains of the frontiers. In the picture added by Chu

[1] Le Tcheou li ou rites des Tcheou. Traduit par Édouard Biot, Paris, 1851, I, p. 432, note 1

[2] *Idem*, II, p. 522.

Hi (fig. 127), one sees on the scepter of this name four masses of rock which represent the mountains.[1] From the explanation given by the commentator it would appear that the great scepter, *tái kwai*, was wrapped with cords of five colors.

The *kwai* are not to be confounded with the tablets called *fát* (Japanese, *shaku*),[2] which were used at audiences in former times, nor with the scepters, *ü í* (jü í; Japanese, *niyoi*) given in China at marriage and to friends for good luck, and carried in Japan by certain priests[3] (fig. 130).

Among the Ainu, in Japan, the men use carved wooden staves to lift their mustache in drinking *saké*. These staves, which they call *ikonit*,[4] are commonly known from their present use as "mustache-sticks." They are about 14 inches in length, flat on one side, and rounded upon the other, which is more or less elaborately carved.[5]

An examination of the twelve specimens in the U. S. National Museum (Plates 19–22) shows a general resemblance to the staves which are tossed in gaming. The flat reverses are nearly all scratched with what were scarcely discernible marks, represented in plates 20 and 22. The writer concludes that these "mustache-sticks" were once emblems of rank or authority.

The only existing objects of remote antiquity with which I am acquainted outside of America that might have been used as divinatory implements in the manner of the staves are a set of ivory rods, discovered by Prof. Flinders Petrie in Egypt, part of which are now in the Museum of Archæology of the University of Pennsylvania.

They constitute a portion of the find made by Professor Petrie in 1895

[1] Le Tcheou-li ou rites des Tcheou. Traduit par Édouard Biot, Paris, 1851, I, pp. 431, 484.

[2] Of the specimens illustrated fig. 128 represents a Chinese tablet scepter in the University Museum. It forms an accessory of a Chinese theatrical costume of a noble of the imperial court and is made of wood, painted brown and varnished, instead of ivory. This scepter is slightly bent, 20 inches in length, about ¼ inch thick, and tapers from 2 inches wide at the base to 1⅜ inch at the top. The *shaku* (fig. 129) is from a tracing of one in the U. S. National Museum, held in the hand of the statue of the Baron Li, said to have been one actually used by that illustrious man.

[3] The *ü í*, literally "as you wish," is of Buddhistic origin, and is one of the *Sapta ratna* or "Seven precious things," which constitute the insignia of a Tchakravartti. In Japan it is carried by the chief priests of the Zen sect, and is used by them to administer a blow to the catechumen when he fails to answer correctly. Its origin presents an interesting problem, its form suggesting that of the throwing-stick. The *fát* or *shaku* are wooden tablets, said to have been originally used for noting memoranda.

[4] J. M. Dixon, The Tsuishikari Ainos, Trans. Asiatic Soc., Japan, XI, Pt. 1, p. 47.

[5] The Japanese call them *hige-age*, "beard raisers." In "A Glance at Three Countries" (*Sangoku Tsuran Zusetsu*), Tokyo, 1785, the author, Rin Shihei, illustrates a mustache-stick, which he describes under this name, stating that they are used by the Ainu for the purpose mentioned.

MUSTACHE STICKS.

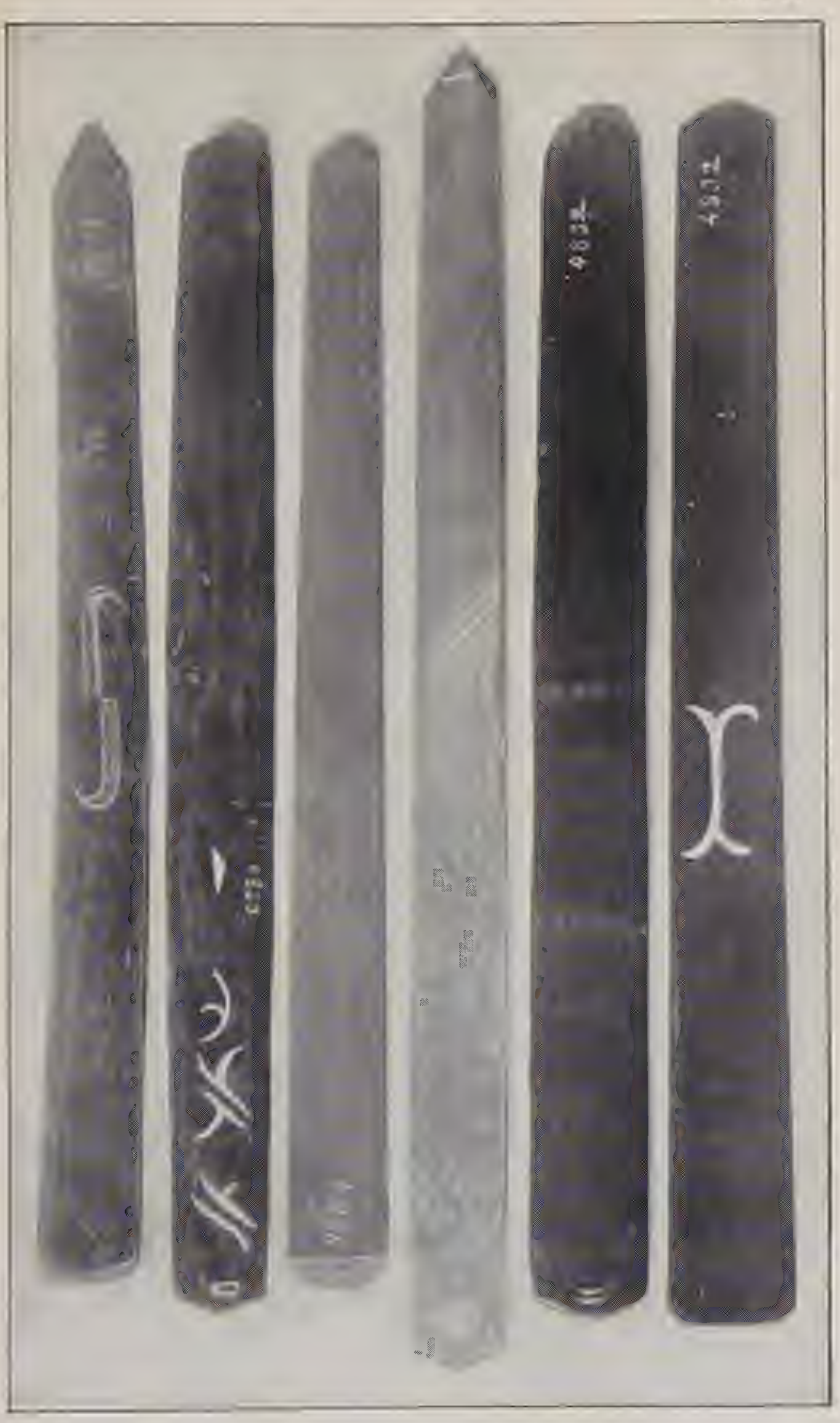
Length, 12⅛ to 13¾ inches.

Ainu of Yezo, Japan.

Cat. Nos. 150697, 150698, 150695, 22261, 150699, 150696, U. S. N. M.

MUSTACHE STICKS.
(Reverse.)
Ainu of Yezo, Japan.

MUSTACHE STICKS.
Length, 12 to 14 inches
Ainu of Yezo, Japan.
Cat. Nos. 150696, 4833, 150699, 22261, 150695, U.S.N.M.



MUSTACHE STICKS.
(Reverse.)
Ainu of Yezo, Japan.

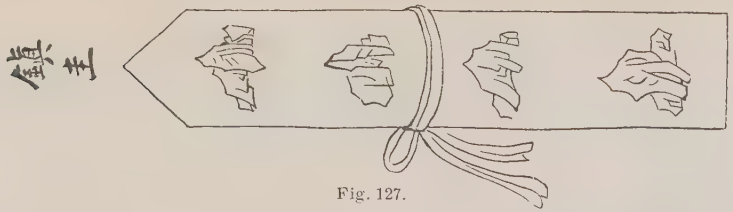


Fig. 127.

SCEPTER OF OMNIPOTENCE (*chan kwai*) ANCIENTLY CARRIED BY THE EMPEROR.

China.

From the Chow Li.

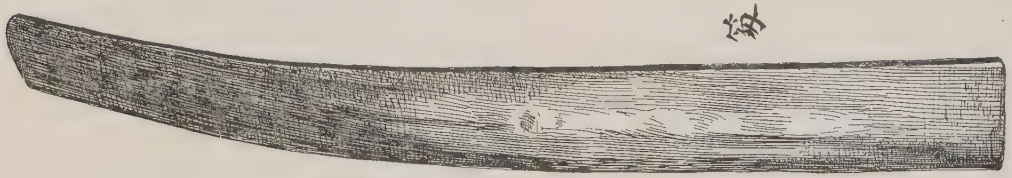


Fig. 128.

WOODEN SCEPTER (*fát*) USED BY NOBLES IN CHINESE THEATER.

Length, 20 inches.

Museum of Archæology, University of Pennsylvania.

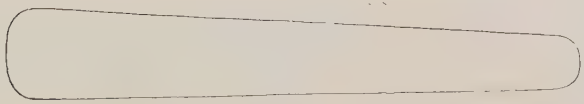


Fig. 129.

BATON OF AUTHORITY (*shaku*) CARRIED BY NOBLES.

Length, 16⅝ inches.

Japan.

Cat. No. 168586, U.S.N.M.

Fig. 130.

BATON (*niyoi*) OF RED LACQUERED WOOD WITH PURPLE CORD, USED BY PRIEST OF ZEN SECT.

Length, 20⅛ inches.

Japan.

Cat. No. 19422, Museum of Archæology, University of Pennsylvania.

between Ballas and Nagada, about 30 miles below Thebes, and attributed by him to a new race, probably Lybian, to whom he assigned a date about 3000 B. C. These rods or staves comprise part of a series from one tomb, "possibly a game," of which he gives the following list:

Twelve ivory rods, fig. 131.

Five ivory rods with incised diagonal lines, fig. 132.

Four figures of lions and one figure of hare, fig. 133.

Seventeen blocks, of which thirteen are bone, two limestone, and two alabaster.

Thirty balls, natural irony concretions.

The twelve ivory rods, possibly intended for counting, are very perfect copies of jointed canes or straws. Four of the five rods with diagonal lines incised are in the University Museum. They are plain on one side, while the other is marked as shown in fig. 132, two having lines in diagonal bands of fours, and two a peculiar mark in the middle, which may have been intended to represent a feminine symbol. I have been unable to learn that any representation of such a game has been identified upon the monuments.

In Africa, Bent[1] gives the following account of the use of the four staves in divination:

> From many of the huts at Inyamanda were hanging their *dollasses*—wooden charms—on which are drawn strange figures (Plate 23). Each family possesses a set of four, tied together by a string. Of these four one always has a curious conventional form of a lizard carved on it; others have battle-axes, diamond patterns, etc., invariably repeating themselves, and the purport of which I was never able to ascertain. They are common among all the Abantu races, and closely bound up with their occult belief in witchcraft. They are chiefly made of wood, but sometimes neat little ones of bone are found, a set of which I afterwards obtained. On the evening of the new moon the village witch doctor will go

[1] The Ruined Cities of Mashonaland, p. 37.

WOODEN AND BONE DOLLASSES (Divining staves).
From drawing in Bent's Ruined Cities of Mashonaland.

round, tossing each man a set of *dollasses* in the air, and by the way they turn up he will divine the fortune of the individual for the month that is to come.[1]

In F. Ratzel's History of Mankind[2] a picture is given of the dice and amulets of a Bamangwato magician in the Ethnographical Museum at Munich (I, p. 85), and again (II, p. 355) of a Kaffir witch doctor's apparatus (amulets, dice, etc.) similar to the preceding in the Museum of the Berlin Mission.

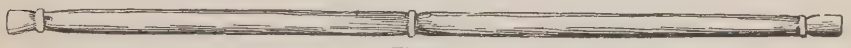


Fig. 131.

IVORY COUNTER FOR GAME (?).

Length, 5¾ inches.

Lybian (?), Egypt.

Cat. No. E. S. 1119, Museum of Archæology, University of Pennsylvania.

Dr. A. Donaldson Smith informs me that he saw a game played with staves throughout Somaliland and by the Sheik Hussein tribe among the Arusa Gallas.

[1] Speaking of the natives of the Zambezi, the Livingstones (David and Charles Livingstone, Narrative of an Expedition to the Zambezi, London, 1865, p. 51) say:

The dice doctor or diviner is an important member of the community being, consulted by Portuguese and natives alike. Part of his business is that of a detective, it being his duty to discover thieves. When goods are stolen he goes and looks at the place, casts his dice, and waits for a few days, and then, for a consideration, tells who is the thief.

Referring to the Guinea negroes, Bosman (William Bosman, A New and Accurate Description of the Coast of Guinea, translated in Pinkerton's Voyages, London, 1814, XVI, p. 399) says:

The second way of consulting their idols is by a sort of wild nuts, which they pretend to take up by guess and let fall again, after which they tell them, and form their predictions from the numbers falling even or odd.

Specimens of pierced cowrie shells used in fortune-telling from the Liberian exhibit at the Columbian Exposition are shown in fig. 134. These objects are now in the Philadelphia Commercial Museum.

The negroes of the French West Indies, according to Labat (Nouveau Voyage aux Isles de l'Amerique, Paris, 1724, IV, p. 153), play a game with cowries. He says: The game which they play in their country, and which they have also carried to the islands, is a sort of game of dice. It is composed of four *bouges* or shells, which are used by them as money. They have a hole purposely made in the convex side, so that they will stand as easily on one side as on the other. They shake them up in their hand as one shakes dice and throw them on a table. If all the sides with holes in them fall uppermost, or the opposite sides of two fall in the same manner and two in the opposite way, the player wins; but if the number of the holes is odd, he loses.

In the Streets of Cairo at the Columbian Exposition was a family of Bishareen Soudanese, living near Assouan, on the Nile, whose head was a dervish belonging to a local order, who practiced soothsaying with cowries (Dr. Talcott Williams). This man threw several cowrie shells, and made his prediction from the manner in which they fell. The cowrie shells correspond with the staves referred to by Bent, and are possibly substitutes for staves, as the writer also infers may be the case with similar shells in the Hindu game of *Pachisi*, No. 38.

[2] Translated by A. J. Butler, London, 1896.

Mr. J. Edward Farnum tells me that among the natives of the Bosi River, about 150 miles from its mouth (19° south latitude, East Africa), the witch doctors throw crocodile scales in fortune telling. The objects used are the nuchal dermosseous plates, from behind the base of the skull. They are smoothed down and polished, and six or eight—always an even number—are thrown. To obtain a reply to a question demanding an answer of "yes" or "no," the smooth side up will be considered

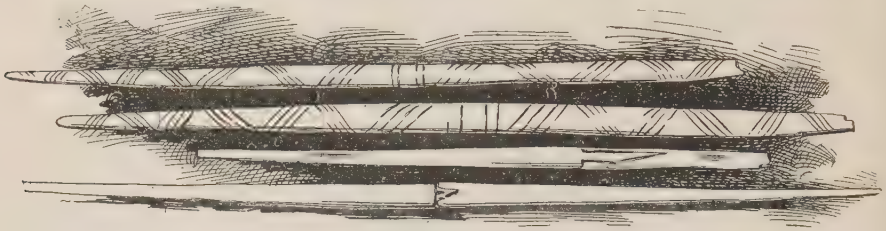


Fig. 132.

IVORY STAVES FOR GAME (?).

Length (perfect stave), 5¾ inches.

Lybian, Egypt.

Cat. Nos. E. S. 1129–1132, Museum of Archæology, University of Pennsylvania.

as "no," and the rough side "yes." An answer is afforded by the manner in which the majority (which must be a considerable one) of the bones fall. The questions put to the witch doctor, who accompanied my informant, were usually about shooting. In reference to the animal to be shot, the doctor would name one side of the bones "masculine" and the other "feminine." According to the answer, a male or female

Fig. 133.

MEN FOR GAME (?) (LION, HARE).

Lengths, 1.37 inches, and 1 inch.

Lybian (?), Egypt.

Cat. Nos. E. S. 1145, 1147, Museum of Archæology, University of Pennsylvania.

animal would be shot. Other determinations of a like character were made by the position of the bones, one to another, after falling.

H. A. Bryden[1] describes a Bushman divining for ostriches while on the hunt by means of three curious looking flat pieces of bone, triangular in shape and scored with a rude pattern.

He pulls them from the hide strip on which they are threaded, shakes them rapidly between his two palms, and casts them upon the earth.

[1] Longman's Magazine, CLXXVII, p. 231.

At the present day the Hottentot children cast lots by twigs—that is, if a thing is lost or a theft has been committed, they throw bits of stick and judge of the culprit, or of the direction wherein the lost property is to be found, by the arrangement of twigs, and among the Kaffirs bundles of sticks and assagais are employed by diviners in their rites for the discovery of crime.[1]

Referring to the Melanesians, Codrington[2] says:

A game which belongs to the Banks Islands and New Hebrides is *tika*, the Fiji *tiqua*, played with reeds dashed in such a manner upon the ground that they rise in the air and fly to a considerable distance. In some islands, as Santa Maria, a string is used to give impetus, and in some the reed is thrown also from the foot. The game is played by two parties, who count pigs for the farthest casts, the number of pigs counted as gained depending on the number of knots in the winning *tika*. When two villages engage in a match, they sometimes come to blows. There are marks on the *tika* to show to whom they belonged. It is remarkable that in Mota a decimal set of numerals is used in this game, distinct from the quinary set used on every other occasion of counting.

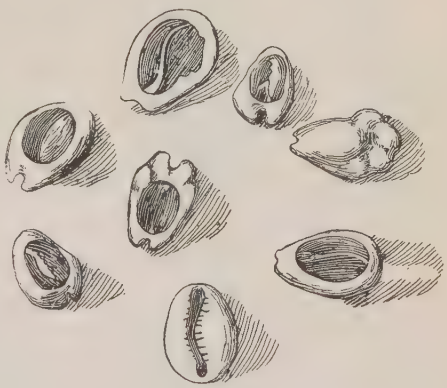


Fig. 134.
COWRIE SHELLS USED IN FORTUNE-TELLING.
Liberia, Africa.
Philadelphia Commercial Museum.

In New Zealand, according to Taylor,[3] the natives had a way of divination by means of sticks. This was called *Niu*.[4] Each chief had a particular name for his own stick; thus, that of one chief was called *Te ata mounu;* that of another, *Te manu i te ra;* and that of a third, *Tongo hiti.* The person consulting the *Niu* went out in the morning before it was light, so that no one should have been out before him, which would destroy the power of consultation, and taking his stick, a short, thin one made of the mahoe, in his right hand, and another representing the enemy in his left, he went and stuck another in the ground; this represented the *tapu;* and placing the two sticks together, one across the other, he uttered a *karakia*, and then threw them in front of a third stick, and it was according to their position that the consulter ascertained whether anyone was traveling on

[1] A. W. Buckland, Rhabdomancy and Belomancy, or Divination by the Rod and by the Arrow, Jour. Anthrop. Inst., V, p. 445.

[2] R. H. Codrington, The Melanesians. Studies in their Anthropology and Folk-lore, Oxford, 1891, p. 340.

[3] Rev. Richard Taylor, Te Ika a Maui, or New Zealand and its Inhabitants, London, 1855, pp. 91, 92.

[4] The name *niu* is a well-known Polynesian word for cocoanut, which was spun among the Polynesians for the purpose of divination. The New Zealanders, although they have no cocoanuts, retain the word as a name for other kinds of divination, especially that performed by sticks. (Dr. E. B. Tylor, Primitive Culture, p. 83.)

the road, whether they are friends or foes, and, if the latter, whether they would be conquered or not.[1]

Different tribes had different ways of consulting the *Niu*, but the practice was general throughout the land. A spirit called *Korohaha Tu* was supposed to reside in the stick.[2]

This manner of divination finds an almost exact parallel in that described by Marco Polo as being resorted to by Chinghis Kaan.[3]

So when the two great hosts were pitched on the plains of Tanduc as you have heard, Chinghis Kaan one day summoned before him his astrologers, both Christians and Saracens, and desired them to let him know which of the two hosts would gain the battle—his own or Prester John's. The Saracens tried to ascertain, but were unable to give a true answer; the Christians, however, did give a true answer, and showed manifestly beforehand how the event should be. For they got a cane and split it lengthwise, and laid one-half on this side and one-half on that, allowing no one to touch the pieces. And one piece of cane they called *Chinghis Kaan* and the other piece they called *Prester John*. And then they said to Chinghis: 'Now mark; and you will see the event of the battle, and who shall have the best of it; for whose cane soever shall get above the other, to him the victory shall be.' Then the Christian astrologers read a Psalm out of the Psalter, and went through other incantations. And lo! whilst all were beholding, the cane that bore the name of Chinghis Kaan, without being touched by anybody, advanced to the other that bore the name of Prester John and got on top of it.

Colonel Yule has collected a number of references to similar divinatory processes, of which the following appear to belong to the same class:

The words of Hosea (IV, 12), 'My people ask counsel at their stocks and their staff declareth unto them,' are thus explained by Theophylactus: 'They stuck up a couple of sticks, whilst murmuring certain charms and incantations; the sticks then, by the operation of devils, direct or indirect, would fall over, and the direction of their fall was noted,' etc. Rubruquis seems to have witnessed nearly the same process that Polo describes. Visiting Lady Kuktai, a Christian queen of Mangu Kaan, who was ill, he says: 'The Nestorians were repeating certain verses, I know not what (they said it was part of a Psalm), over two twigs which were brought into contact in the hands of two men. The monk stood during the operation.' Petis de la Croix quotes from Thévenot's travels a similar mode of divination as much used, before a fight, among the Barbary corsairs. Two men sit on the deck facing one another, and each holding two arrows by the points, and hitching the notches of each pair of arrows into the other pair. Then the ship's writer reads a certain Arabic formula, and it is pretended that, whilst this goes on the two sets of arrows, of which one represents the Turks and the other the Christians, struggle together in spite of the resistance of the holders, and finally one rises over the

[1] If the stick representing his tribe fell above the other, it was a favorable sign; if below, a bad one.

[2] The following parallel custom exists among the Tsuishikari Ainu, as described to J. M. Dixon in the work cited: "A man in the tribe, desirous to know the will of the Deity regarding a certain matter, called in the aid of the *tusugura* (magician-doctor). He came at night with two fresh willow (*susu*) wands, stripped of the bark, which he placed on a mat by the hearth. Then he called upon the *unjika-mui* (Fire-god) to declare his will. Soon the footsteps of the god were heard; they came up to the side of the *tusugura;* the wands showed signs of restlessness and struck the mat on which they were placed. Two raps signified permission; a scraping or rubbing was an unfavorable augury."

[3] Colonel Henry Yule, The Book of Ser Marco Polo, London, 1871, I, p. 213.

other. P. Della Valle (II, 865–866) describes the same process, conducted by a Mohammedan conjuror of Aleppo: 'By his incantations he made the four points of the arrows come together without any movement of the holders, and by the way the points spontaneously placed themselves, obtained answers to interrogatories.' And Mr. Jaeshke writes from Lahaul: 'There are many different ways of divination practiced among the Buddhists; and that also mentioned by Marco Polo is known to our Lama, but in a slightly different way, making use of *two arrows*, instead of a cane split up, wherefore this kind is called *da-mo* (arrow divination).' Indeed, the practice is not extinct in India, for in 1833 Mr. Vigne (I, 46) witnessed its application to detect the robber of a government chest at Lodiana.

It will be observed that in three of the examples the sticks or twigs are replaced by arrows.

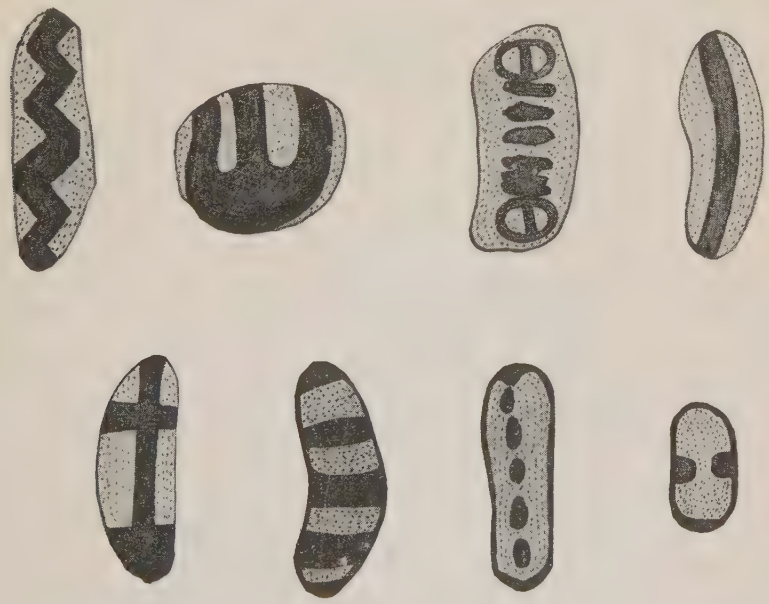


Fig. 135.

PEBBLES FROM MAS D'AZIL.

In concluding this examination, reference should be made to the suggestion by Col. Garrick Mallery[1] that the colored pebbles found in the grotto of Mas d'Azil, in the department of Ariège, France, were used in gaming.

Only one face of these pebbles bears a design (fig. 135). Colonel Mallery says:

To an observer familiar with the gambling games of the North American Indians, in which marked plum-stones and similar objects are employed, these stained flat pebbles at once suggest their use to suggest values in a game by the several designs and by the pebbles falling on the figured or on the unmarked side.[2]

[1] Tenth Annual Report of the Bureau of Ethnology, p. 549.

[2] Ed. Piètte, Les galets coloriés du Mas-d'azil, L'Anthropologie, VII, No. 3.

6. SHING KÚN T'Ò. "The Game of the Promotion of Officials." Canton, China.

Board[1] and Dice.[2] A celebrated Chinese game, best known through Dr. Hyde's account as "the Game of the Promotion of Mandarins," played by two or more persons upon a large paper diagram, upon which are printed the titles of the different officials under the Chinese Government. Four dice are thrown, and the players advance through the various grades according to their throws.[3]

This complicated game may be regarded as a modification of the *Nyout* circuit, the dice replacing the staves. Its line of descent is indicated by the corresponding Korean game, which follows.

7. TJYONG-KYENG-TO. The Game of Dignitaries. Korea.

(*a*) Wooden die.[4]

(*b*) Reproduction of native picture of players engaged at the game.[5] (Plate 24.)

The Korean form of the Chinese game of *Shing kún t'ò*. A long five-sided wooden die (fig. 136), with its edges notched with strokes from one to five, is employed, instead of cubical dice.

Fig. 136.
TJYONG-KYENG-TO.
Length, 4 inches.
Korea.
Cat. No. 175660, U.S.N.M.

I regard the use of this die as older than that of cubical dice, and the die itself to have been derived from the four staves, such as are employed in *Nyout*. This implement furnishes a connecting link with the spinning die or teetotum (fig. 137), which, notched like it, is also used in Korea in the same game.

The diagram for the game in the University Museum (Cat. No. 17626) is written in Chinese characters upon a sheet of white Korean paper 23½ by 37½ inches. This is divided by lines into one hundred and eight (9 by 12) rectangles, in each one of which is the title of a Korean official, with the indication beneath it for the next move, accordingly as the throw is from one up to five. Another Korean game (Cat. No. 17699) in the same museum, played in the same manner with the same kind of die upon a sheet of paper of the same size, is entitled *Nam-seung-to* (Chinese, *lám shing tò*), or "View-winning game." The sheet is divided by lines into one hundred and forty-four squares (9 by 16), within

[1] Cat. No. 169333, U.S.N.M. Gift of Stewart Culin.

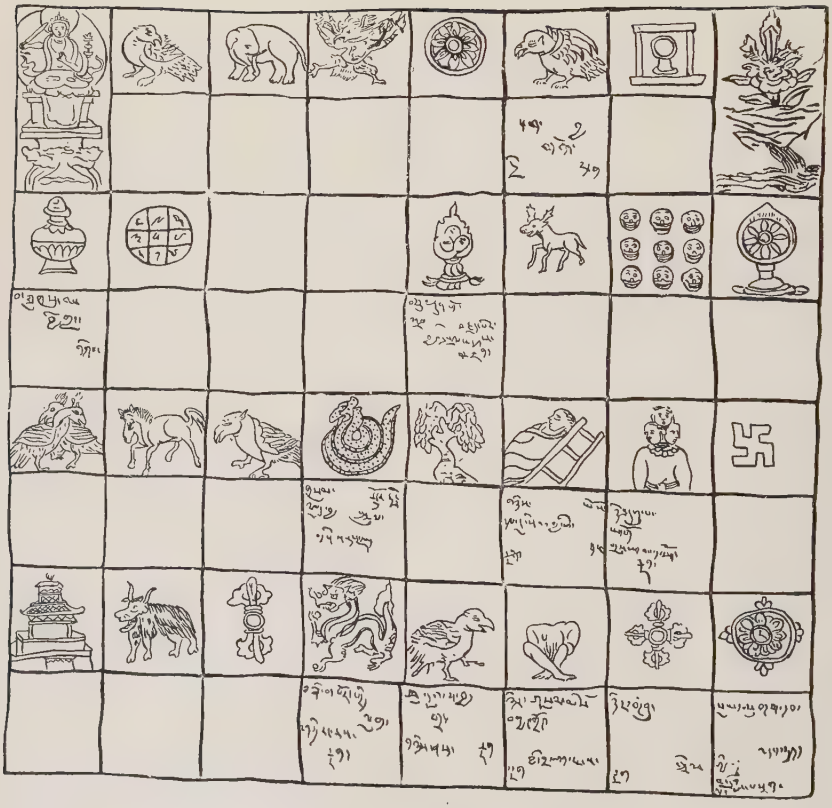
[2] Cat. No. 152548, U.S.N.M.

[3] Described at length in Chinese Games with Dice and Dominoes, Report U. S. Nat. Mus., 1893, p. 504.

[4] Cat. No. 175660, U.S.N.M. Gift of Stewart Culin.

[5] Stewart Culin, Korean Games.

KOREANS PLAYING TJYONG-KYENG-TO.
From painting by native artist, reproduced in Korean Games.



DIVINATORY DIAGRAM.
Tibet.
After Schlagintweit.

which are written the names of places throughout Korea famous for beauty of scenery.[1] Still another Korean game (Cat. No. 17628) of this type in the University Museum is known as the "Monk's *tjyong-kyeng-to*," and is intended for the purpose of giving instruction in the religion of Buddhism. The sheet, which measures about 12 inches square, is inscribed with a diagram, the inner part of which is divided into one hundred and sixty-nine squares (13 by 13). These contain the names of the various conditions of existence, advancing from the lowest forms through the eighteen Brahmalokas, to the goal, which is Nirvana.

Fig. 137.

TJYONG-KYENG-TO.

Length, 1½ inches.

Korea.

Cat. No. 17627, Museum of Archæology, University of Pennsylvania.

It is, in fact, a Buddhist game of Promotion. The moves are made according to the throws with three small wooden dice (fig. 138), each inscribed on its six sides with the magic formula: *Nám mò o ní t'o fát* (*Namah Amitâbha*). Under each name is written the place of the next move, according to the throw. The name at the top of the sheet is in Sanskrit characters, which are also written on seven of the squares, while the remainder of the text is in Chinese.[2]

Fig. 138.

KOREAN DIE FOR BUDDHIST GAME.

$\frac{4}{16}$ by $\frac{4}{16}$ by $\frac{5}{16}$ inch.

Cat. No. 17629, Museum of Archæology, University of Pennsylvania.

An interesting parallel to this game is to be found in the French *Jeu Moral et Instructif*, the goal of which is Paradise.

This last described Korean game suggests a likely explanation of certain Tibetan divination tables figured by Schlagintweit.[3]

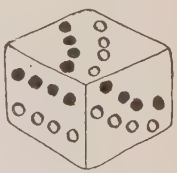


Fig. 139.

DIE USED WITH DIVINATORY DIAGRAM.

Tibet.

Reproduced from description by Schlagintweit.

Cat. No. 19423, Museum of Archæology, University of Pennsylvania.

One of these (Plate 25) forms part of a great roll inscribed with other divinatory diagrams. It is divided into squares, of which those in the upper corners, left and right, bear, respectively, pictures of the Bodhisattva Manjusri, and the sword of wisdom, the emblem of his knowledge. Of the remaining sixty squares one-half are inscribed with religious emblems and the others, placed immediately beneath, with Tibetan words which in greater part were illegible. The assumption that the diagram is intended for a divinatory game, like the Korean Buddhist game above referred to, is supported by much corroborative evidence. Thus, on page 326 we find the following

[1] For which the Koreans have a passion, making excursions for the sake of the scenery to celebrated sites.

[2] That is, Chinese transcriptions and explanations of the Sanskrit names. A detailed account of the game is being prepared by the writer.

[3] Buddhism in Tibet.

rules for using a simliar diagram, with the title, "Directions for finding out the due answers:"

1. "Begin to count the terrestrial fortress from the celestial king." (Manjusri).

3. "Count the water from the tiger."

4. "Count the earth from the tiger," etc.

Here we have the rules. The die according to which the count was made was doubtless the one (fig. 139) of which the faces are represented upon the same roll. The pictured squares contain devices of birds, animals, etc., labeled good, middling, or bad. The words beneath may indicate possibly the place of the next move, as in the Korean game.

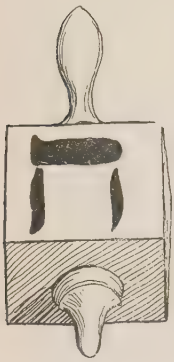


Fig. 140.

TEETOTUM (*würfel*) USED BY JEWISH CHILDREN AT PURIM.

Height, 2 inches.

Original in possession of Dr. Herbert Friedenwald.

8. CH'É MÉ. Teetotum.[1] China.

Prismatic die with six faces, marked so that the sum of each of the opposite faces equals seven, the spots being marked like Chinese dice, No. 19. Spun by means of a bamboo pin passing through the middle.

This implement has its counterpart in the East Indian *chukree*, which is used in a similar game played on a diagram marked like six faces of a die. The *chukree* is said to be used only at the Divali Festival, which occurs in November, when gambling is permitted. A parallel is seen in the four-sided teetotum, which Jewish children in Germany and Russia play with during the eight days at Purim, or the Feast of Lots. This die (fig. 140) bears upon its sides the Hebrew letters: *shin*, *nun*, *he*, *gimel*. They are playfully regarded as standing for the German words *stell*, "put;" *nichts*, "nothing;" *halb*, "half;" *ganz*, "all." Prof. Leo Weiner informs me that the letters are intended for the phrase: *shām nēs hāyā gādôl*, "there wonder great has happened." Prof. Weiner writes:

Fig. 141.

LONG LAWRENCE.

Length, 3 inches.

Almondbury, England.

Reproduction from description by Mrs. Gomme.

From Korean games.

The name of the *würfel* is *drēdl* (*draidle*), which is a diminutive of *dreher*, turner, twister. This latter word is used exclusively for the turning rattle of wood or metal used on the same holiday, as the children say, "to turn Haman," i. e., to drown him, or disgrace him in the noise. The manner of making is as follows: A block of wood, generally a round stick or part of a twig, is cut lengthwise into four parts; the inner edges are shaved off to admit the molten lead which thus forms the stem of the *drēdl*. The form of the *drēdl*, with its letters on each face, is cut on the flat sides of each part; then the four parts are put together, after being tied with a cord and are placed in sand or into the ground, and the metal is poured into the mould.

[1] Cat. No. 169324, U.S.N.M. Gift of Stewart Culin. Chinese Games with Dice and Dominoes, fig. 3, Report U. S. Nat. Mus., 1893, p. 496.

9. LONG LAWRENCE.[1] Wooden die (fig. 141). Almondbury, England.

Reproduction from description given by Mrs. Gomme.[2] This die is described in Easther's Almondbury Glossary, quoted by Mrs. Gomme, under the name of *Lang Lawrence*, that is "Long Lawrence," as an instrument marked with signs, a sort of teetotum.

A "Long Lawrence" is about three inches long, something like a short ruler with eight sides; occasionally they have but four. On one side are ten X's or crosses, forming a kind of latticework; on the next to the left, three double cuts or strokes, passing straight across in the direction of the breadth; on the third a zig zag of three strokes one way and two or three the other, forming a W, with an additional stroke or triple V; on the fourth, three single bars, one at each end and one in the middle, as in No. 2, where they are doubled; then the four devices are repeated in the same order. The game, formerly popular at Christmas, can be played by any number of persons. Each has a bank of pins or other small matters. A pool is formed; then in turn each rolls the "Long Lawrence." If No. 1 comes up the player cries "flush," and takes the pool; if No. 2, he puts down two pins; if No. 3, he says "lave all," and neither takes nor gives; if No. 4, he picks up one. The sides are considered to bear the names "Flush," "Put doan two," "Lave all," "Sam up one." It has been suggested that the name "Lawrence" may have arisen from the marks scored on the instrument, not unlike the bars of a gridiron on which the saint perished.

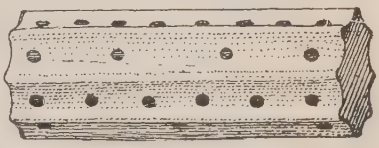


Fig. 142.

LOG. IVORY DIE.

Length, 2⅞ inches.

United States.

Cat. No. 7134, Museum of Archæology, University of Pennsylvania.

The Korean die used in *Tjyong-kyeng-to* suggests the probable origin of this instrument.

10. LOG.[3] Long ivory die, with eight fluted sides marked with spots from one to eight (fig. 142). England or United States.

Used by gamblers in the latter country. The specimen exhibited is false, throwing high or low according to the direction in which it is held when rolled. Similar to the preceding.

11. RAMALA PÁSÁ. Dice for fortune-telling.[4] India.

Reproductions of two varieties, both consisting of square wooden prisms,[5] about 3 inches in length. One is a single die, marked on its four long sides with numerals from one to four; the other, a set of three dice, marked in the same manner with three, four, five, and six spots.

The custom of telling fortunes with dice is current throughout India, where it is practiced as a science under the name of *Ramala*,[6] and has

[1] Cat. No. 175659, U.S.N.M. Gift of Stewart Culin.

[2] The Traditional Games of England, Ireland, and Scotland, London, 1894, I, p. 326.

[3] Cat. No. 7134, Mus. Arch., Univ. Penn.

[4] Cat. Nos. 9051, 9052, Mus. Arch., Univ. Penn.

[5] The originals are of red sandalwood.

[6] Derived from the Arabic *raml* (sand). Geomancy is known by the Arabs as *ilmu-l-raml*, or the science of sand. Upon this sand (for which paper is, however, sometimes substituted), they draw many unequal lines, upon which are disposed a certain number of points, from the combinations of which they pretend to foretell

an extensive literature. There are several different methods, in all of which the dice are used as implements of magic to determine number, reference then being had to the pages of a book numbered to correspond.[1] They agree in general with the Chinese methods of divination with arrow-staves. (See Nos. 65, 69.)

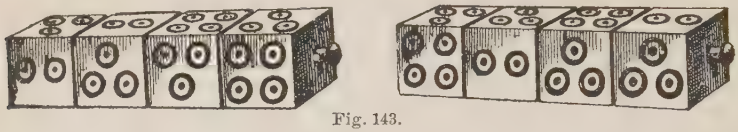


Fig. 143.
RAMALA PÁSÁ.
Length, 1⅛ inches.
Lucknow, India.
From Proceedings Numismatic and Antiquarian Society of Philadelphia, 1891.
Cat. No. 9046, Museum of Archæology, University of Pennsylvania.

12. RAMALA PÁSÁ. Dice for fortune-telling.[2] Lucknow, India.

Two sets each of four cubical ivory dice, marked on four sides with two, three, and four dots (fig. 143). A rod upon which they revolve passes through the center of the unmarked sides and binds them together.

A similar die in the writer's possession, obtained by Professor Hilprecht, through the courtesy of Rev. Albert S. Long, in Constantinople, is represented in fig. 144. The dice are strung upon an iron rod, with brass knobs at the ends. They are of alloy, resembling copper, and are marked in the same manner as the Hindu set.

Fig. 144.
DICE FOR FORTUNE-TELLING.
Length, 3 7/16 inches.
Constantinople, Turkey.
In the writer's possession.

There are two sets, each of two pairs of four each, of similar metal dice from Persia in the Sommerville collection (Cat. Nos. 283, 278) in the University Museum. The dice Cat. No. 283 are entirely of brass, while Cat. No. 278, which are smaller, comprise two brass dice with deep holes, set with small pieces of turquoise, placed in the middle, and two dice, with incised spots, one next to each knob. Cat. No. 283 is accompanied by an inscribed brass placque (fig. 145), 3¼ inches in diameter, with the twelve signs of the Zodiac in the outer circles and the seven stars (sun, moon, and five planets) in the inner,

future events. It is in great credit in the East, many elaborate treatises having been written on the subject. *Rammal*, a conjurer in the art of Geomancy. John Richardson. Persian, Arabic, and English Dictionary, London, 1806, art. *raml*. The invention of the science is commonly attributed to Edris (the prophet Enoch), and also to Daniel.

[1] An account of *Ramala* was given by the writer, East Indian Fortune-telling with Dice (Proc. Num. and Ant. Soc. of Phila., 1890–91, p. 65).

[2] Cat. No. 9046, Mus. Arch., Univ. Penn.

and Cat. No. 278 with an octagonal brass placque (fig. 146), $3\frac{1}{8}$ inches in diameter, with six concentric and thirty-two radial divisions having the names of as many oriental cities in the outer row, of conditions of life and fortune in the next inner, and personal names in the third row.

13. PÁSÁ. Long dice.[1] Lucknow, India.

Square ivory prisms, about 2 inches in length, marked with one, two, six, and five spots in concentric circles. The one and six and two and

Fig. 145.

BRASS PLACQUE ACCOMPANYING DICE FOR FORTUNE-TELLING.

Diameter, $3\frac{1}{8}$ inches.

Persia.

Cat. No. 283. Sommerville collection. Museum of Archæology, University of Pennsylvania.

five are opposite, and the two and five are red. Used in the game of *Chausar* (No. 40). A similar die was used in *Chaturanga* or "Dice Chess" (No. 45).[2]

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[1] Cat. No. 7133, Mus. Arch., Univ. Penn.

[2] On the Hradischt near Stradonitz in Bohemia, which is referred to *La Tène* period, several hundred longish stick-dice, marked with concentric circles (dice eyes), were found (fig. 147). Of the four longer faces, two opposite ones are broader than the two others. The ends are plain, while the long sides are marked three, four, five, six, so that the broader faces have three, four, and the narrower ones five, six. (Osborne in Mitteil. des Anthropol. Ges., Wien, X, p. 255, quoted from Ethnographische Parallelen und Vergleiche, Richard Andree, Leipzig, 1889, II, p. 104). In commenting upon the above find, Osborne states that in North German, Holstein, and Danish finds these stick-dice also appear. These latter are similar to those of Hradischt, but are to be distinguished from them, however, by the markings, as they mostly only have the spots on the three long sides (with the numbers three, four, and six), leaving the fourth side unmarked. He continues that, after numerous inquiries (in Germany, Holstein, Denmark, and Switzerland), if at any other place entirely similar dice to those found in the Hradischt had been discovered, he received

I regard these long dice as the more or less direct outcome of the divining staves.

14. ASTRAGALI (TALI). Knuckle bones.[1] Natural bones from the ankle of a sheep.

Used as dice by the Greeks and Romans, and in common use at the present day for the same purpose in the Mohammedan East and in Southern Europe and Spanish America.

Knuckle bones have been used as implements in games from remote antiquity. There are several distinct ways in which they are thus employed. One was as jackstones, described by classical authors as

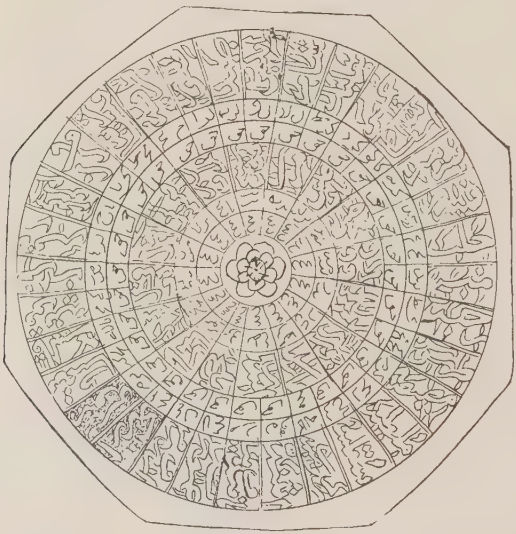

Fig. 146.

BRASS PLACQUE ACCOMPANYING DICE FOR FORTUNE-TELLING.

Diameter, 3⅛ inches.

Persia.

Cat. No. 278, Museum of Archæology, University of Pennsylvania. Sommerville collection.

played principally by women and children with five bones, the same number employed in modern times.[2] Among the Syrians at the present day they are used by children in games resembling marbles, being knocked from a ring drawn on the ground with others, which are sometimes weighted with lead.[3] A favorite and almost universal use of knuckle bones in games was as dice in games of chance. Among the

a negative answer, except from the museum at Biel (Canton Berne), in which are part of the materials of La Tène. This pile dwelling has furnished two stick-dice that entirely correspond with those from Hradischt.

[1] Cat. No. 152546, U.S.N.M. Gift of Stewart Culin.

[2] Used at the present day by French children under the name of *osselets*.

[3] Stewart Culin, Syrian games with Knuckle-bones, Pro. Num. and Ant. Soc. of Phila., 1890-91, p. 123.

Greeks and Romans numerical values were attributed to the four long sides, the two pointed ends not being counted. The two broad sides, respectively convex and concave, counted three and four, while of the narrow sides, the flat counted one and the indented six. The numbers two and five were wanting.[1]

Several names, both Greek and Latin, are recorded for each of the throws.

Two persons played together at this game, using four bones, which they threw into the air, or emptied out of a dicebox (*fritillus*). The numbers on the four sides of the four bones admitted of thirty-five different combinations. The lowest throw of all was four aces, but the value of a throw was not in all cases the sum of the

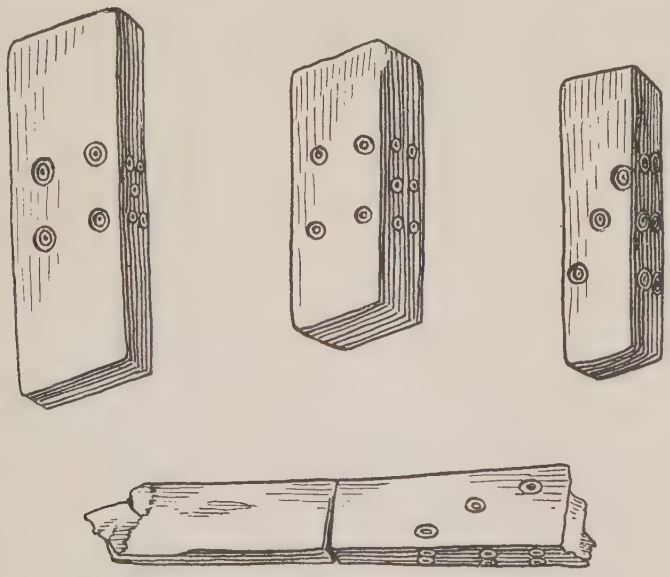

Fig. 147.

STICK-DICE.

Bohemia (Hradischt near Stradonitz).

After Osborne.

four numbers turned up. The highest in value was that called *Venus*, in which the numbers cast up were all different. Certain other throws were called by particular names, taken from gods, illustrious men and women, and heroes. These bones, marked and thrown as above described, were also used in divination.[1]

Among the Turks, Arabs, Persians, the four throws with a single knuckle bone receive the names of the four ranks of human society. Thus, among the Persians, according to Dr. Hyde, they were called as follows:[2]

Supinum, Dudz, "thief."
Pronum, Dihban, "peasant."
Planum, Vezir.
Tortuosum, Shah.

[1] Smith's Dictionary of Greek and Roman Antiquities, Art. *Talus.*

[2] Thomas Hyde, De Ludis Orientalibus, Oxford, 1694, p. 147.

The Arabic name for the bones is *káb* (dual, *kábatain*, plural, *kabat*), meaning "ankle," referring to their source. Two bones are now commonly used—one from the right and the other from the left leg of a sheep.[1] I regard them as the direct ancestors of cubical dotted dice, the name of which in Arabic is the same as that of the bones. The dice used in Arabic countries are made in pairs (see No. 16), and the most popular and universal game is one with two dice, *kábatain*.

0 2 2 1

Fig. 148.

VALUES OF THE THROWS WITH KNUCKLE BONES.

Tarahumara Indians, Chihuahua, Mexico.

Games with knuckle bones are a favorite amusement in Spanish-American countries, and it is claimed that they existed among the Indians before the discovery. Dr. Carl Lumholtz found them among the Tarahumara,[2] who attribute numerical values to the different sides.

Among the Papago in Arizona Mr. W J McGee found a single knuckle bone of a bison, used in playing a game called *Tan-wan*, of which a specimen collected by him (fig. 149,) is exhibited in the U. S. National Museum (Cat. No. 174443).

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[1] The favorite game among the Turkomans, according to Vámbéry (Arminius Vámbéry, Sketches of Central Asia, Philadelphia, 1868, p. 110), is the *Ashik* game (*ashik*, the ankle bones of sheep), which is played in the manner of European dice with the four ankle bones of a sheep, and with a degree of passionate excitement of which one can form no idea. The upper part of the bone is called *tava*, the lower *altchi*, and the two sides *yantarap*. The player takes these four little bones into the palm of his hand, throws them up and receives half the stake, if two *tava* or two *altchi*, and the whole of the stake, if all four *tava* or *altchi* turn up.

The advantage to be gained arises entirely from dexterity in throwing. Trickery is impossible, since the bones are frequently changed.

Dr. Karl Himly (Die abteilung der Spiele in Spiegel der mandschu-sprache, T'oung Pao, VI, p. 335) gives the Manchu name of knuckle bone as *gaćura*. It would appear from his account that several games were known corresponding to those described by the author as played by Syrian children. One, played by children, in which the bones were employed as jackstones; another in which they were used as dice, and a third filliping a knuckle bone at something or throwing at a knuckle bone set in the ground. The Chinese name of knuckle bone is *púi shik kwat* (pei si ku).

[2] They call the game *Tu wí tui wa la*. They play with two knuckle bones. The counts are shown in fig. 148. In addition to these counts, if a bone stands on its pointed end it counts six, and on the end opposite, twelve.

Twelve points constitute a game. The specimens collected by Dr. Lumholtz are in the American Museum of Natural History (Cat. No. $\frac{6.5}{3.0.5}$).

The game is played by two persons, who sit facing each other, 4 or 5 feet apart. The bone is twirled into the air out of the thumb and forefinger, the back of the hand being held upward. The position in which it falls on the ground controls the count in the game. So long as the player succeeds in throwing the pitted side, or "cow-hoof," as it is called, upward, he retains possession of the bone, and with each throw wins one bean from a prearranged number equally divided between the players. The sides do not count in the play, and the thrower may play again and again without forfeiting the bone until he throws the flat side (opposite the "cow-hoof") upward, when the bone goes to his opponent to throw, with the same conditions. The winning of the entire number of an opponent's counters constitutes a game won.

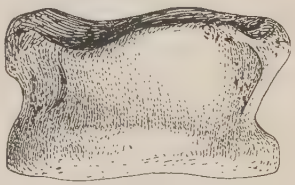

Fig. 149.
ASTRAGALUS OF BISON USED AS DIE.
Papago Indians, Pima County, Arizona.
Cat. No. 174443, U.S.N.M.

In Costa Rica, Dr. T. M. Calnek informs me that the Indians in the vicinity of San José continually play with the astragalus of an ox or cow, using a single bone. They call the game by the name of *Choque suelo*.

They are also used by the Indians in Peru. Their Quichua name, *tava*, would appear to be derived from the Spanish *taba*, but this is contrary to the opinion entertained by my informant, Dr. Emilio Montez,[1] who exhibited a prehistoric copy of a knuckle bone in terra cotta, from Cuzco, in his collection at the Columbian Exposition.[2]

Fig. 150.
ASTRAGALUS USED IN GAME.
Lengua Indians.
Cat. No. 1797, Field Columbian Museum. Hassler collection.

There are nine astragalus bones from the Lengua tribe, Chaco Indians, in the Hassler collections from Paraguay, in the Field Columbian Museum. Prof. William H. Holmes, who courteously furnished me with the accompanying drawing (fig. 150), informed me that all but one bear scratched lines, as represented.

Knuckle bones of various animals, some worked and showing wear, have been found associated with Indian remains in various parts of the United States. Mr. Clarence B. Moore found a fossil llama astragalus in a mound on Murphy Island, Putnam County, Florida, and a large fossil astragalus, not yet identified, in a mound on Ossabow Island,

[1] Dr. Montez tells me that of the four ways in which a knuckle bone may fall, two do not count, while one of the others wins and one loses.

[2] Cat. No. 340, Field Columbian Museum, Chicago. Montez collection.

Bryan County, Georgia. Mr. William W. Adams found knuckle bones in stone graves opened by him in Williamson County, Tennessee. Thirty or forty bones were found in perhaps a hundred graves. They were always found in pots. Children's graves contained smaller pots, and the bone was smaller, evidently from a small animal. Some were worn until nearly smooth on the side, and all showed polish as though they had been carried or used a long time. A number of specimens from mounds are contained in the U. S. National Museum, as Cat. No. 63047, astragalus of bison from a mound, Pecan Point, Mississippi County, Arkansas, and Cat. No. 63047*a*, astragalus of deer from same place, both collected by Mr. Edward Palmer. Three specimens (Cat. No. 61621) are from Lyons County, Kentucky; two others (Cat. No. 91145) catalogued from Arkansas, are respectively of deer and bison; another (Cat. No. 169518) is from Lepanto, Poinsett County, Arkansas. Some of these bones are squared, so as to have six instead of four sides, many are more or less cut down, and one is partly calcined. Mr. Cushing found a number of knuckle bones of deer, several showing high polish from long use, in the muck deposit explored by him at Marco, Florida.

In England knuckle bones were formerly used in games.[1] A single bone was tossed and the four sides received, according to Dr. Hyde, the following names:[2]

Supinum, "Put in."
Pronum, "Blank."
Planum, "Take half."
Tortuosum, "Take all."

These terms sufficiently explain the method of play.

[1] De Ludis Orientalibus, p. 142.

[2] Under the head of *Cockall*, Brand (Observation on Popular Antiquities, London, 1813, II, p. 288) gives the following account:

In the English translation of Levinus Lemnius, fol. London, 1658, p. 368, we read:

"The antients used to play *Cockall* or casting of huckle bones, which is done with smooth sheep bones. The Dutch call them *Pickelen*, wherewith our young maids that are not yet ripe use to play for a husband, and young married folks despise these as soon as they are married. But young men use to contend with another with a kind of a bone taken forth of oxe-feet. The Dutch call them *Coten*, and they play with these at a set time of the year. Moreover *Cockals*, which the Dutch call *Teelings*, are different from dice, for they are square with four sides, and dice have six. *Cockals* are used by maids amongst us, and do no ways waste any one's estate. For either they pass away the time with them, or if they have time to be idle they play for some small matter, as for chestnuts, filberds, pins, buttons, and some such 'juncats.'

"In Langley's Abridgment of Polydor Vergile, fol. 1, we have another description of this game: 'There is a game that is played with the posterne bone in the hynder foote of a sheepe, oxe, gote, fallowe, or redde dere, whiche in Latin is called *Talus*. It hath foure chaunces, the ace point, that is named *Canis*, or *Canicula*, was one of the sides. He that cast it leyed downe a peny or so muche as the gamers were agreed on; the other side was called Venus, that signifieth seven. He that cast the chaunce won sixe and all that was layd downe for the castyng of *Canis*. The two other sides were called *Chius* and *Senio*. He that did throwe *Chius* wan three. And he that cast *Senio* gained four. This game (as I take it) is used of children in Northfolke, and

15. ASTRAGALI.[1] Glass, ancient.

Copies in glass of natural knuckle bones for use in games. Of very common occurrence among the remains of classical antiquity. Bronze *astragali* are found (fig. 151), and they are also recorded to have been made of ivory and agate.

16. KABATAIN. Dice.[2] Lucknow, India.

Cubes of ivory regularly marked—that is, the six and one, five and two, and four and three opposite, so that their sum is equal to seven.[3] The spots are arranged so that the two dice are each the complement of the other. The "fours" are inscribed in red. The spots consist of small circles with an interior dot, the customary manner of marking Indian dice, which agrees in this respect with those of ancient Rome.

Fig. 151.
BRONZE ASTRAGALUS.
Length, 1 1/16 inches.
Cat. No. 949, Sommerville collection. Museum of Archæology, University of Pennsylvania.

17. KUBOS. Die.[4] Ancient Greek. Naucratis, Egypt, about 600 B. C.

An irregular cube with rounded sides about an inch square. The material is limestone, with drilled holes for pips. Found by Prof. W. M. Flinders Petrie in 1885.[5]

It is said that no traces of cubical dotted dice have been discovered in Egypt in the purely Egyptian period, but they occur in the Delta from the time of Psammetichus I (about 670 B. C.). They are regarded by scholars as a foreign introduction.

In the British museum there are two dice of glazed baked clay from Assyria, found with tablets of Assurbanipal (668–623 B. C.) at Kouyunjik.

As the glaze of the dice is unlike that of Assyrian pottery, and from the fact that the mounds at Ninevah were occupied by a Parthian village about 200 B. C., Mr. Pinches concluded that the dice proba-

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they call it the Chaunce Bone; they playe with three or foure of those bones together; it is either the same or very lyke to it."

In a note Brand states: "In The Sanctuarie of Salvation, etc., translated from the Latin of Levinus Lemnius by Henry Kinder, 8vo., Lond., pr. by H. Singleton, p. 144, we read these bones are called huckle-bones or coytes."

[1]Cat. No. 16488, Mus. Arch., Univ. Penn. Chinese Games with Dice and Dominoes, fig. 31, Report U. S. Nat. Mus., 1893, p. 536.

[2]Cat. No. 7145, Mus. Arch., Univ. Penn. Chinese Games with Dice and Dominoes, fig. 27, Report U. S. Nat. Mus., 1893, p. 534.

[3]Almost the invariable arrangement, the principal exceptions being the Etruscan and Korean dice. The only other known to the writer are the Hindu dice (Nos. 11, 12) used in fortune telling, and the dice employed in the Burmese game of dominoes (No. 24).

[4]Cat. No. 168983*a*, U.S.N.M., from original, Cat. No. 17575, Mus. of Arch., Univ. Penn. Chinese Games with Dice and Dominoes, fig. 28, Report U. S. Nat. Mus., 1893, p. 534.

[5]A somewhat similar die from Naukratis in the British Museum has leaden points projecting from the holes, as if the die had been left unfinished. The dots forming the three are arranged ⁎ ⁎ ⁎, in the same manner as upon the above.

bly belonged to this or a later period. I am told by Dr. Morris Jastrow that no word for dice has yet been discovered in the cuneiform.

18. TESSERAE.[1] Dice, Ancient Roman or Etruscan. Purchased in Florence, Italy.

Cubes of bone,[2] about an inch square, regularly marked, the pips consisting of concentric circles. As is frequently the case with Roman dice, these dice are made of a hollow bone, the openings on two opposite sides being stopped with bone plugs. Several of the Roman dice in the University Museum are stained a greenish color with salts of copper.

Three *tesserae* or cubical dice were anciently employed, while four *tali* or knuckle bones were used. It is recorded, however, that as early as the time of Eustathius the modern practice of using two dice instead of three had been established.[3]

In order to prevent cheating, dice were cast into conical beakers (*pyrgus*, *turricula*), the interior of which was formed of different steps. A parallel to this is found in the Siamese backgammon, *Saka*, where the dice are thrown into the *krabok*.[4]

The classical games with dice, of which accounts have come down to us, were chiefly played in connection with a board or table (*abacus*, *tabula*, *alveus*, *alveolus*), on which pieces or men were moved according to the throws. These pieces were round or oval stones (*calculi*), or later, draftsmen (*latrunculi*), just, as with us, the same men are used for draughts and backgammon.

Professor Lanciani[5] states that the one hundred and more gaming-tables (*tabulae lusoria*) found in Rome, mostly during his lifetime, belong to six different games of hazard. In some of them, the mere chance of dice-throwing was coupled with a certain amount of skill in moving the "men" or *tesserae*. Their outline is always the same. There are horizontal lines at equal distance, each line containing twelve signs, thirty-six in all. The signs vary in almost every table; there are circles, squares, vertical bars, leaves, letters, monograms, crosses, crescents, and immodest symbols; the majority of these tables (sixty-five)

[1] Casts No. 168983*b*, U.S.N.M., from originals Cat. No. 15781, Mus. Arch., Univ. Penn. Chinese Games with Dice and Dominoes, fig. 29, Report U. S. Nat. Mus., 1893, p. 535.

[2] A great variety of materials have been used for dice. Among seventy dice, exhibited in a case in the Greek and Roman section of the British Museum, the materials are divided as follows:

Bone or ivory	32	Jet	2	Green stone	1	Marble	1
Bronze	11	Meteoric iron	1	Gray stone	1	Amber	1
Agate	5	Pyrites	1	Black stone	1	Baked clay	1
Rock crystal	4	Copper	1	Quartz	1	Porcelain	1
Onyx	3	Lead	1	Alabaster	1		

A close-grained wood, especially privet, is recorded as having been employed for dice. (Smith's Dictionary of Greek and Roman Antiquities. Art. *Tessera*.)

[3] *Idem*.

[4] Chinese Games with Dice and Dominoes, fig. 9, Report U. S. Nat. Mus., 1893, p. 501.

[5] Rudolfo Lanciani, Gambling and Cheating in Ancient Rome, The North American Review, July, 1892.

contain words arranged so as to make a full sentence with thirty-six letters. The rules of the games played upon these tables are as yet only conjectural.

The game of *Duodecim scripta*, "twelve lines," was substantially the same as our backgammon. It was played upon a board with twelve double lines, with fifteen white and fifteen black men; the throws were counted as we count them; the "blots" might be captured; the pieces (whether they started from home or not) had to be brought home, and the winner was he who first cleared off his men. The principal variation from the modern game lies in three dice being employed instead of two, agreeing in this respect with the game of *Pachisi* (No. 38). According to Heroditus[1] games with dice (including also knucklebones and ball) were invented by the Lydians as a diversion during a time of famine, that they might not feel the craving for food.

19. Shik Tsai.[2] Dice. China.

Cubes of bone, regularly marked, but differing from those of India in having both the "ones" and "fours" marked in red; the "one" spots larger than the others, and in all the spots being simple round marks, without circumscribed circles. They are not made in pairs, and are usually sold in sets of six.

The Chinese play a great variety of dice-games, the principal one being with two dice, and known as *Chák t' ín kau*, "Throwing Heavens and Nines," from the names of the two highest throws. In this game the twenty-one throws that can be made with two dice receive different names, and are divided into two series or suites, called *man*, "civil," and *mò*, "military."

The eleven *Man* throws in the order of their rank are:

"Double six," called *t'ín*, "Heaven."
"Double one," called *tí*, "Earth."
"Double four," called *yan*, "Man."
"One, three," called *wo*, "Harmony."
"Double five," called *múi*, "plum flower."
"Double three," called *chéung sám*, "long threes."
"Double two," called *pán tang*, "bench."
"Five, six," called *fú t'au*, "tiger's head."
"Four, six," called *hung t'au shap*, "red head ten."
"One, six," called *kò kéuk ts'at*, "long leg seven."
"One, five," called *hung ch'ui luk*, "red mallet six."

The ten *Mo* throws in the order of their rank are:

"Five, four," and "six, three," called *kau*, "nines."
"Five, three," and "six, two," called *pát*, "eights."
"Five, two," and "four, three," called *ts'at*, "sevens."
"Four, two," called *luk*, "six."
"Three, two," and "four, one," called *'ng*, "fives."
"One, two," called *sám*, "three," or *sám kai*, "three final."

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[1] Book 1, Chap. 94.

[2] Cat. No. 152548, U.S.N.M. Gift of Stewart Culin. Chinese Games with Dice and Dominoes, fig. 1, Report U. S. Nat. Mus., 1893, p. 492.

The antiquity of dice in China is not known. They appear to have been introduced into that country from India. It will be observed that a cosmical significance is attached to the dice throws, the "six" being called "Heaven," and its opposite, "one," "Earth." The "four" between is designated as "Man." [1]

Korean dice, called *tjyou-să-ă*, differ from those of China in having the 1 and 2, 3 and 4, and 5 and 6 opposite. A set in the University Museum, collected by Dr. E. B. Landis, are marked with plain black dots, arranged like the Hindu *kábatain*, to form a pair. A single Korean die (fig. 152), in the same museum, is a rectangular prism, flat instead of square. The arrangement of the dots is the same, but the "one" and the "four" is in red, as well as the two middle spots of the "six" and the middle spot of the "five" and of the "three."

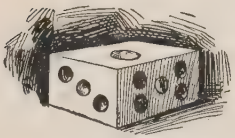

Fig. 152.

KOREAN DIE.

Cat. No. 17606, Museum of Archæology, University of Pennsylvania.

It is interesting to note that the arrangement of the dots on the Korean dice is the same as that on some of the Etruscan dice.[2] A peculiar importance is attached to the latter, from the fact that it is believed by Etruscologists that the first six numerals of the Etruscan language have been recovered from a pair of dice exhumed in 1848 near Toscanella.[3] These dice, now in the Cabinet of Medals and Antiques in the National Library, Paris, bear, instead of the usual pips or dots, the following words in Etruscan letters: Mach, Thu, Huth, Ki, Zal, Sa. These words have been variously interpreted by scholars upon the assumption that they are numerals, and also that the pips which they are supposed to replace were uniformly arranged 1 + 3, 2 + 4, 5 + 6 (Campanari's law). Comparison of the Etruscan dice words with the numerals used in the Korean game of *Nyout*, a comparison suggested by the fact of the agreement of the Korean and Etruscan dice in their dissimilarity from other dice, shows a curious correspondence.

Korean stave-game numerals:	Etruscan dice names:
1. *To* or *ta*.	*Thu*.
2. *Kăi* or *Ká*.	*Ki*.
3. *Kel* or *Kol*.	*Zal*.
4. *Nyout* or *ute*.	*Huth*.
5. *Mo*.	*Mach*.
6.	*Sa*.

[1] Chinese Games with Dice and Dominoes, Report U. S. Nat. Mus., 1893, p. 494.

[2] Among the dice in the British Museum regarded as Etruscan, which vary in their pips from the regular arrangement (that is, 1 + 6, 2 + 5, 3 + 4), three have 1 + 2, 3 + 4, 5 + 6, and three 1 + 3, 2 + 4, 5 + 6. What appears to be a set of three dice, made of amber, have one marked 1 + 2, 3 + 4, 5 + 6; one 1 + 3, 2 + 4, 5 + 6, and one regular, 1 + 6, 2 + 5, 3 + 4. Two iron dice (Cat. No. 15786) in the University Museum, purchased at Perugia, have their dots arranged 1 + 3, 2 + 4, 5 + 6.

[3] Daniel G. Brinton, The Ethnologic Affinities of the Ancient Etruscans, Proc. Amer Philos. Soc., Philadelphia, XXVI, 1887, p. 522.

From the fact of the *nyout* numerals being in all probability derived from an Ural-Altaic stock, their correspondence with the dice words would seem to support Canon Isaac Taylor's[1] theory of the Ugric origin of the Etruscans. It should be observed, however, that if the words stand for numerals they are not paired[2] in either of the ways (1 + 3, 2 + 4, 5 + 6, or 1 + 2, 3 + 4, 5 + 6) in which Etruscan dice are marked.[3] The doubt as to their being numerals is reinforced by the Korean die inscribed with the prayer to Buddha (p. 821).

20. SAI. Dice,[4] Japan. Pair of plaster dice for *Sugoroku* (No. 28).

Japanese dice are similar to those of China, from which country they were doubtless borrowed. The "fours" are sometimes, but not invariably, marked in red. The most popular game is *Sugoroku* (No. 28).

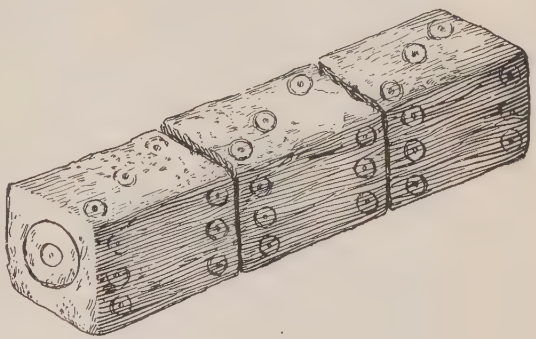

Fig. 153.
ETRUSCAN TRIPLICATE DIE.
Length, 3⅜ inches.
Chiusi.
Museum of Archæology, University of Pennsylvania.

Before leaving the subject of dice it may be observed that cubical dotted dice do not appear to have been known to the American tribes before the time of the conquest. At the same time mention should be made of a die of steatite found with Indian remains at Kiokee Creek, Columbia County, Georgia, in the collection of Dr. Roland Steiner, in the United States National Museum (Cat. No. 172563). It consists of a rudely cut square prism of steatite about ⅞ inch in length. Two of the opposite longer sides are marked with six and four pits and two with five and three. One of the ends has two and the other what is doubtless intended for one dot. The pips are irregularly disposed. It no doubt dates from the time of white contact.

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[1] Etruscan Researches, London, 1874.

[2] "*Mach* is opposite *Zal*, *Thu* is opposite *Huth*, and *Ki* is opposite *Sa*." Robert Ellis, Etruscan Numerals, London, 1876.

[3] Since the above was written the writer has acquired an Etruscan triplicate bone die (fig. 153) found in Chiusi or its vicinity, on which the dots are arranged differently from any thus far noticed by him. The 6 is here opposite the 4, and 5 opposite 3. One of the ends is marked 1 and the other 2. The spots are marked with small dotted circles which retain traces of red paint. It has been suggested that these triplicate dice, which are not infrequent, are unfinished and have yet to be sawed apart. It is evident from this specimen that such is not the case. They bear a strong general resemblance to the *Ramala pásá*, or dice used in fortune-telling, among which we find three cubical dice united by a metal bar, and again, in another variety used in India, the same arrangement of spots: 3, 4, 5, 6 on a long die. (See p. 824.)

[4] Cat. No. 7143, Mus. Arch., Univ. Penn.

21. KWAT P'ÁI.[1] "Bone tablets," dominoes. Canton, China.

Set of thirty-two domino pieces of teak wood $2\frac{5}{8}$ inches by $\frac{7}{8}$ inch by $\frac{3}{8}$ inch. Natural wood, with incised spots painted white and red.

Chinese dominoes are marked in the same manner as the dice, from which they are clearly derived. There are twenty-one distinct pieces, representing the permutations of two dice. Eleven of these pieces are doubled, making a total of thirty-two in the set. Each piece received a name, and in the popular game of *Tá t'ín kau*, or "Heavens and Nines," the thirty-two pieces are divided into two suites or series, called *Man*, "civil," and *Mò*, "military."

The *Man* pieces are as follows:

$\frac{6}{6}$, called *t'ín*, "Heaven."
$\frac{1}{1}$, called *tí*, "Earth."
$\frac{4}{4}$, called *yan*, "Man."
$\frac{1}{3}$, called *wo*, "Harmony."
$\frac{5}{5}$, called *múi*, "plum flower."
$\frac{3}{3}$, called *chéung sam*, "long threes."
$\frac{2}{2}$, called *pán tang*, "bench."
$\frac{6}{3}$, called *fú t'au*, "tiger's head."
$\frac{6}{4}$, called *hung t'au shap*, "red-head ten."
$\frac{5}{1}$, called *kò kéuk ts'at*, "long-leg seven."
$\frac{5}{1}$, called *hung ch'ui luk*, "red-mallet six."

Each of the above pieces is duplicated, the duplicates mating.

The *Mò* pieces:

$\frac{2}{4}$ and $\frac{1}{2}$, called *chí tsün*, "supreme."
$\frac{6}{3}$ and $\frac{4}{3}$, called *tsáp kau*, "heterogeneous nines."
$\frac{6}{2}$ and $\frac{5}{3}$, called *tsáp pát*, "heterogeneous eights."
$\frac{4}{3}$ and $\frac{5}{2}$, called *tsáp ts'at*, "heterogeneous sevens."
$\frac{1}{4}$ and $\frac{3}{2}$, called *tsáp 'ng*, "heterogeneous fives."

They mate as above. The two pieces called *chí tsün*, or "supreme," when paired rank as the highest of the *Mò* series, but when apart, as the lowest.

The game of *Tá t'ín kau* is in many respects the most interesting Chinese domino game. It somewhat resembles the card games of Europe, and is of considerable antiquity in China, existing, according to Mr. Wilkinson,[2] in 1120 A. D.

The invention of the game of dominoes has been variously attributed to the Jews, the Greeks, and the Chinese. It may be justly credited to the latter people. No date can be assigned to its invention, and from the cosmical associations of the pieces, and their use in divination, which continues in China to the present day, it may be regarded as having been originally used for that purpose. That dominoes originated in dice is clearly apparent, the chief problem being the reason for the duplication of the eleven pieces. With the knowledge derived from the study of games in general, this may be assumed to have been done

[1] Cat. No. 131397, U.S.N.M. Gift of Mrs. J. K. Van Rensselaer. Chinese Games with Dice and Dominoes, fig. 18, Report U. S. Nat. Mus., 1893, p. 510.

[2] Chinese Origin of Playing-Cards, American Anthropologist, January, 1895.

in order that the dice throws might accord with the thirty-two points that represent the Four Quarters and the intermediary divisions of the world. They may be looked upon as having been implements of magic for determining number and place, corresponding with playing cards, from which they only differ in material, as Mr. Wilkinson has suggested.[1]

In addition to the long wooden dominoes, small dominoes, made of bamboo, or bone, or wood and bone conjoined like those of Korea, are used in various parts of China. Sets in which the series is several times duplicated also occur in China, as well as dominoes on which the dots are replaced by the characters that stand for the chess pieces, and the suit marks of certain Chinese playing-cards.[2]

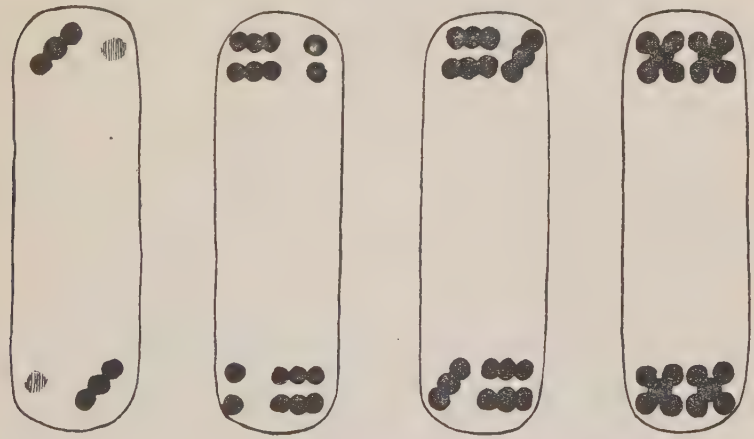

Fig. 154.

DOMINO CARDS.

Length, 3⅝ inches.

China.

From W. H. Wilkinson, Chinese Origin of Playing Cards, The American Anthropologist, January, 1895.

Cat. No. 27, Museum of Archæology, University of Pennsylvania. Wilkinson collection.

22. TÍM CHÍ P'ÁI. "Dotted paper tablets." Domino playing cards.[3] Hankow, China.

Set of eighty-four cards, 3⅝ inches by 1 inch, with rounded corners and red backs, consisting of the twenty-one natural dominoes of the Chinese series, quadrupled (fig. 154).

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[1] The writer is inclined to believe that in the assignment of the dice casts to the thirty-two points, they were first practically applied to as many divining slips or arrow lots, consisting of long, narrow strips of bamboo. Such objects occur at the present day in the so-called *chiá p'ái*, or "leaping tablets," of which a set from Fuh-chau exists in the Museum of the Long Island Historical Society. They consist of thirty-two slips of bamboo, about 14 inches in length, with domino spots marked at one end, contained in a cylindrical bamboo box from which they are thrown, resembling the *Ts'ím ü* (No. 69).

[2] For a detailed account of Chinese dominoes, consult Mr. Wilkinson's catalogue in Official Catalogue of Exhibits, World's Columbian Exposition, Department M. Anthropological Building, Chicago, 1893.

[3] Cat. No. 27, Mus. Arch., Univ. Penn. Wilkinson collection.

These cards are designated by the collector, Mr. W. H. Wilkinson, as *Pát t'ín kau* from their being used in the game of *T'ín kau*. Several varieties of domino cards occur in China. The evolution of playing cards from dice through the wooden domino seems at first sight to be clearly apparent, but the true ancestor of the playing card is doubtless found in the arrow, as shown under Korean playing cards.

23. KOL-HPAI. "Bone Tablets." Dominoes. Korea.

(*a*) Set of thirty-two domino pieces.[1]

(*b*) Reproduction of native picture.

Kī-săing (singing girls) playing dominoes with a guest (Plate 26).[2]

Korean dominoes consist of small bone or ivory tablets, or of bone and wood conjoined like those exhibited. The set consists of thirty-two pieces, identical with those of China. They receive different names, however, and are mated differently from the Chinese. The names are as follows:

1–1, *syo-syo* (Chinese, *siú siú*), "smallest."
1–2, *tjoui-hko* (Chinese, *shü pí*), "rat nose."
1–3, *syo-sam* (Chinese, *siú sám*), "small and three."
1–4, *păik să* (Chinese, *pák sz'*), "white and four."
1–5, *păik-i* (Chinese, *pák 'ng*), "white and five."
1–6, *păik-ryouk* (Chinese, *pák luk*), "white and six."
2–2, *tjoun-a* (Chinese, *tsun á*), "superior two."
2–3, *a-sam* (Chinese, *á sam*), "two and three."
2–4, *a-sá* (Chinese, *á sz'*), "two and four."
2–5, *koan-a* (Chinese, *kun á*), "sovereign two."
2–6, *a-ryouk* (Chinese, *á luk*), "two and six."
3–3, *tjyang-sam* (Chinese, *ch'éung sám*), "long three."
3–4, *sam-sá* (Chinese, *sám sz'*), "three and four."
3–5, *sam-o* (Chinese, *sám 'ng*), "three and five."
3–6, *sam-ryouk* (Chinese, *sám luk*), three and six."
4–4, *tjoun-hong* (Chinese, *tsun hung*), "superior red."
4–5, *să-o* (Chinese, *sz' 'ng*), "four and five."
4–6, *să-ryouk* (Chinese, *sz' luk*), "four and six."
5–5, *tjoun-o* (Chinese, *tsun 'ng*), "superior five."
5–6, *o-ryouk* (Chinese, *'ng luk*), "five and six."
6–6, *tjoun-ryouk* (Chinese, *tsun luk*), "superior six."

The method of pairing is shown in fig. 155.[3] The Korean games differ from those of China, the most popular, called *Hō-hpai*, "Foreign or Chinese Tablets," having many points of resemblance to the Chinese system of fortune-telling in which dominoes are used (See Chinese Games with Dice and Dominoes). Korean dominoes are clearly of Chinese origin.

24. DOMINOES.[4] Burma.

Set of twenty-four pieces of teak wood.

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[1] Cat. No. 77024, U.S.N.M. Collected by Lieut. J. B. Bernadou, U. S. N.

[2] From Korean Games.

[3] The errors in the plate (9) in the Report of the U. S. National Museum, 1893, are here corrected.

[4] Cat. No. 166510, U.S.N.M. Collected by Mr C. C. Ellis, acting United States Consular Agent. Chinese Games with Dice and Dominoes, plate 10, Report U. S. Nat. Mus., 1893, p. 528.

KOREANS PLAYING DOMINOES.

From painting by native artist, reproduced in Korean Games.

Burmese dominoes resemble in size and material the wooden dominoes of Southern China. They are marked with incised circles (sometimes with small brass disks) as follows:

6–6, 1–1, 4–4, 1–3, 5–5, 3–3, and 2–2 duplicated, and one each of the following pieces: 6–3, 4–5, 6–2, 5–3, 4–3, 5–2, 2–4, 1–4, 2–3, and 1–2, the last having two smaller spots adjoining the "1."

They are accompanied by a cubical die about ¾ inch square, with two opposite faces marked with one spot, two opposite faces marked with two spots, and two opposite faces marked with three spots. This is used to decide who shall play first.

Dominoes are also a common game in Siam, where they are called *Tautem* (Chinese, *tá-tím*), "Arranging," or "Connecting Spots." A set consists of twenty-four pieces, thin, rectangular tablets of ivory, marked as follows: the pieces 6–6, 1–1, 4–4, 1–3, 5–5, 3–3, 2–2, 5–6, 4–6, 1–6, and 1–5 duplicated, and one of each of the pieces 6–3 and 6–2. Both Burmese and Siamese dominoes are probably derived from China.

25. DOMINOES. United States.[1] Set of twenty-eight pieces, bone, with black wood backs.

Dr. Gustav Schlegel states that the European game of dominoes was borrowed from the Chinese, the philosophic-astromonic elements being done away with, and only the arithmetical retained.

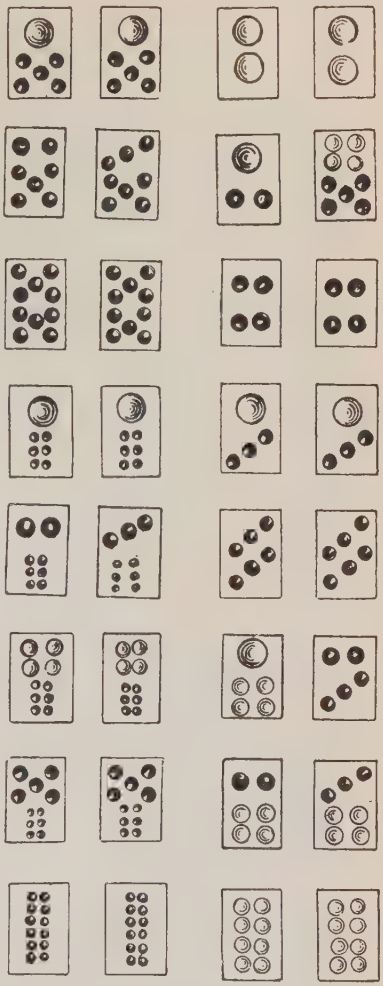

Fig. 155.
KOL-HPAI DOMINOES.
Korea.
Cat. No. 77024, U.S.N.M.
From Korean Games.

The game seems to date from a recent period in Europe. According to Brockhaus' Conversations-Lexikon, Article "Domino," it was introduced into Germany through France from Italy about the middle of the last century. In England it appears, from a writer in *Notes and Queries*, to have been introduced by French prisoners about the close of the last century.

[1] Cat. No. 17576, Mus. Arch., Univ. Penn. Purchased in Washington, D. C.

26. DOMINOES.[1] Eskimo. Labrador, North America.

Flat pieces of ivory, cut in irregular shapes, marked on one face with spots arranged in different patterns. The number of pieces in a set varies from sixty to one hundred and forty-eight.

According to Mr. Lucien M. Turner, by whom they were collected, the game is played in the following manner:

Two or more persons, according to the number of pieces in the set, sit down and pile the pieces before them. One of the players mixes the pieces together in plain view of the others. When this is done, he calls them to take the pieces. Each person endeavors to obtain a half or third of the number, if there be two or three players. The one who mixed up the pieces lays down a piece and calls his opponent to match it with a piece having a similar design. If this can not be done by any of the players, the first has to match it, and the game continues until one of the players has exhausted all of the pieces taken by him. The pieces are designed in pairs, having names such as *ka mú tik* (sled), *kaiak* (canoe), *kalé sak* (navel), *á ma zut* (many), *a taú sïk* (1), *má kok* (2), *pïng a sut* (3), *si tá mût* (4), and *tá li mat* (5). Each of the names above must be matched with a piece of similar kind, although the other end of the piece may be of a different design. A *kamutik* may be matched with an *amazut*, if the latter has not a line or bar cut across it; if it has a bar, it must be matched with an *amazut*.

This game is known to the people of the Ungava district, but those only who learn it from Northerners are able to play it. The northern Eskimo stake the last article they possess on the issue of the game. Their wives are disposed of temporarily, and often are totally relinquished to the victor. I have heard of wives so disposed of often sit down and win themselves back to their former owners.

The game appears to have been borrowed from European rather than Asiatic sources.

Another set of Eskimo dominoes (Plate 27), differing in their marks from the preceding, is contained in the American Museum of Natural History in New York City (Cat. No. $\frac{60}{1177}$). It was collected by Capt. George Comer from the Central Eskimo of Savage Islands, West Coast of Hudson Bay, and consists of thirty-six pieces of ivory marked with dots, running irregularly from eight on one side down to blank. It is clearly a degenerate form of the European game.

27. CHONG ÜN CH'AU. Game of the Chief of the Literati. Canton, China. Tallies and dice.[2]

Chong üin ch'au is played with tallies, *ch'au*, the highest of which is called *chong ün*, the name given the Optimus at the examinations for the degree of Hanlin, whence I have styled it "The Game of the Chief of the Literati." Two or more persons may play, using six dice and sixty-three bamboo tallies. The players throw in turn from right to left, and after throwing each draws the tally he is entitled to for his throw.

This game is in many respects analogous to the Game of Promotion

[1] Cat. No. 76880, U.S.N.M. Chinese Games with Dice and Dominoes, plate 12, Report U. S. Nat. Mus., 1893, p. 529.

[2] Cat. No. 25539, U.S.N.M. Gift of Stewart Culin. Chinese Games with Dice and Dominoes, plate 3, Report U. S. Nat. Mus., 1893, p. 496.

SET OF IVORY DOMINOES.
Savage Islands.
Cat. No. $\frac{69}{1177}$, American Museum of Natural History, New York.

GAME OF GOOSE (*Giuoco Dell' Oca*).
Length, 16 inches; width, 12 inches.
Florence, Italy.
Cat. No. 17373, Museum of Archæology, University of Pennsylvania.

(No. 6), the titles of different officials being painted upon tallies instead of being printed upon a diagram. The form of the tallies suggest the probability of their having been derived from arrows. An American Indian analogue is found in the Micmac game of *woltes-takun* (p. 697).

28. SUGOROKU. "Double Sixes." Japan. Board[1] and teetotum.[2]

A common game with Japanese children, usually played at the New Year. The diagram or board, which is printed in colors, is divided into a number of divisions distinguished by pictures. One of the most popular forms is called *dô chiu*, or "traveling" *sugoroku*, and is played upon a large sheet of paper on which are represented the various stopping places on a journey. The moves are made according to the throws with one or more dice, or with a teetotum (Japanese *coma*). The game exhibited is entitled *Nan niyo ichi dai shus-sei sugoroku* or "Boys and girls step by step advancing *sugoroku*," and is printed in colors upon a large sheet of paper. Another game in the museum is entitled *Kamakura ei-yu sugoroku*, or "The heroes of Kamakura *surgoroku*," and another, *Gakko sei-to ben kiyo surgoroku*, or "School-students studying *sugoroku*." New games are published in Japan at each recurring New Year. Like the corresponding games at the present day in Europe and America, they frequently reflect whatever is uppermost in the popular mind. Thus, in 1894–95 the war with the Chinese gave rise to the *Shina sei batsu sugoroku*, or "Punishing China *surgoroku*," a specimen of which is in the University Museum (Cat. No. 17687). The name *sugoroku* is more correctly applied to the game of backgammon played with two dice, but is used at the present day in Japan to designate all games played on boards or diagrams in which the moves are made by throwing dice.

29. JEU DE L'OIE. Game of Goose.[3] France.

Folding board imprinted with diagram 14 by 18 inches, having sixty-three numbered stations; dice and men.

The pieces are moved according to the throws. A common game in France at the New Year.

30. GIUOCO DELL' OCA. "Game of Goose." Florence, Italy.

Lithographed diagram[4] with ninety numbered stations around which the players move their men, according to the throws. (Plate 28.)

31. JUEGO DE LA OCA. Game of Goose.[5] Mexico.

Paper diagram printed with sixty-three numbered stations. Similar to the preceding. A similar Mexican game entitled the *Juego del Laberinto*, in the University Museum (Cat. No. 16474) has sixty-three

[1] Cat. No. 7130, Mus. Arch., Univ. Penn.
[2] Cat. No. 7139, Mus. Arch., Univ. Penn.
[3] Cat. No. 15489, Mus. Arch., Univ. Penn.
[4] Cat. No. 15503, Mus. Arch., Univ. Penn.
[5] Cat. No. 18263, Mus. Arch., Univ. Penn.

numbered stations arranged to represent a snake, the direction being from head to tail.

32. GAME OF GOOSE.[1] United States.

Board, men, and spinning arrow[2] used instead of dice. The board has ninety-nine numbered stations.

33. SNAKE GAME.[3] United States.

Board printed in colors with one hundred and twenty-two numbered stations.

The first game of this type published in the United States is said to have been "The Mansion of Happiness," issued by Mr. S. B. Ives of Salem, Massachusetts, about the year 1847, and said to have been copied from an English game. Mr. Ives was the first publisher of games as a business in this country. In 1861 Mr. Milton Bradley of Springfield, Massachusetts, published the "Checkered Game of Life." These were the forerunners of a large number of similar games in the United States, among which the following are included in the collection of the University of Pennsylvania: "Steeple Chase"; "Yacht Race"; "Bicycle Race"; "Messenger Boy"; "Round the World," together with others with more or less fanciful titles invented in order to secure the protection of copyright.

The prototype of the boards in these and the preceding games (Nos. 28 to 32) is to be found in the Korean *Nyout* circuit.

The following foreign games of the foregoing type are contained in the collection of the Museum of Archæology and Paleontology of the University of Pennsylvania.[4]

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[1] Cat. No. 16467, Mus. Arch., Univ. Penn.

[2] A square of cardboard, with the numbers from 1 to 6 arranged in a circle, and a metal arrow fastened to revolve on a pivot in the center. It and similar contrivances are substituted on account of the prejudice against the use of the dice through their association with gambling.

[3] Cat. No. 175656, U.S.N.M. Gift of Stewart Culin.

[4] The European specimens are in greater part the gift of Dr. H. Carrington Bolton. See his paper, The Game of Goose, Journal of American Folklore, VIII, p. 145.

Museum No.	Publisher's No.	Name.	Place of manufacture.	Publisher.	Material.	Size.[1]	Number of houses or stations.	Implements.	Number.[2]
						Inches.			
		CHINESE.							
7132	.....	Shing kún t'ò	Peking	.....	Paper	23 by 25	409	Dice	4
		DANISH.							
17513	7429	Alleryeste Gaasespil	Germany	.....	do	12 by 14	100	do	2
		DUTCH.							
17514	.....	Jeu du cacao van Houten	Amsterdam	Amand. Lith	do	20 by 27	63	do	2
		ENGLISH.							
17397	.....	The New Royal Game of Goose	England	.....	do	16 by 20	63	Tectotum	1
		FRENCH.							
17420	.....	Jeu du conscrit	Epinal	Pellerin et Cie	do	15 by 20	63	Dice	2
17421	.....	Jeu des courses de chevaux	do	do	do	13 by 21	100	do	2
17417	.....	Jeu historique de la France militaire	do	do	do	14 by 20	63	do	2
17418	1738	Jeu de la marine	do	do	do	15 by 20	63	do	2
15489	.....	Jeu de l'oie	do	do	Cardboard	14 by 18	63	do	2
17424	722	Jeu militaire	do	Oliver-Pinot	Paper	11 by 16	63	do	2
17423	.....	Jeu de l'oie	do	Pellerin et Cie	do	9 by 9	63	do	2
17414	481	do	do	do	do	11 by 14	63	do	2
17422	1713	Grand jeu de l'oie	do	do	do	14 by 18	63	do	2
17419	1711	Jeu de l'oie renouvelé des Grecs	do	do	do	14 by 17	63	do	2
17400	1	Jeu de l'oie	do	Oliver-Pinot	do	14 by 18	63	do	2
17425	721	do	do	do	do	10 by 15	63	do	2
17416	1735	Jeu du petit voyageur	do	Pellerin et Cie	do	14 by 20	63	do	2
17415	501	Jeu du soldat	do	do	do	11 by 15	63	do	2
17402	177	Jeu du chemin de fer	Metz	P. Didion	do	9 by 14	63	do	2
17404	398	Jeu de Juif-Errant	do	do	do	9 by 14	63	do	2

[1] The size of the imprint is indicated to the nearest inch.

[2] This is only given when the number of dice appears in the rules.

Games of Goose in Museum of Archæology and Paleontology, University of Pennsylvania—Continued.

Museum No.	Publisher's No.	Name.	Place of manufacture.	Publisher.	Material.	Size.	Number of houses or stations.	Implements.	Number.
		FRENCH—continued.				*Inches.*			
17407		Jeu de Juif-Errant	Metz	P. Didion	Paper	15 by 20	63	Dice	2
17401	397	Jeu moral et instructif	do	do	do	9 by 14	63	do	2
17409		do	do	do	do	15 by 20	63	do	2
17398		Jeu des mystères de Paris	do	Gangel	do	14 by 20	63	do	2
17403	12.)	Jeu de l'oie renouvelé des Grecs	do	P. Didion	do	11 by 16	63	do	2
17405		do	do	do	do	15 by 20	63	do	2
17399	44	do	do	Gangel	do	14 by 20	63	do	2
17412		Jeu des rois de France	do	Delhalt	do	15 by 20	63	do	2
17410		do	do	P. Didion	do	15 by 20	63	do	2
17413		Grand jeu du sorcier	do	Delhalt	do	15 by 20	63	do	2
17438	1	Jeu d'oie	Weissenburg	C. Burckardt	do	14 by 19	63	do	2
17436		Grand jeu du pont terrible	Nancy	E. Ferry	do	15 by 22	52	do	2
17429		Grand jeu de l'amour	Paris	A. Repos	do	14 by 16	40	do	2
17516		Grand jeu du pigeon voyageur	do	(imp.) Lehoucq	do	25 by 31	87	do	2
16253		Le voyage à Pékin	do	Watillaux	Folding board	19 by 19		Teetotum	1
17428		Grand jeu franco-russe	Pont-à-Mousson	Marcel Vagne	Paper	15 by 20	63	Dice	2
17427	269	Jeu de l'oie	do	do	do	14 by 18	63	do	2
17426	322	do	do	do	do	10 by 15	63	do	2
17517	2069	do			do	9 by 12	63	do	
17519		do			Folding board	18 by 22	63	do	
17518		Le tour de monde			Paper	11 by 13	46	do	
16475		Jeu de tournoi			do	18 by 21	74	do	2
		GERMAN.							
17433		Eisenbahn-Spiel	Mainz	Jos. Scholz	do	11 by 15	56	do	2
17434	3	Post- und Reise-Spiel	do	do	do	10 by 15	56	do	2
17431	2	Robinson-Spiel	do	do	do	13 by 14	30	do	2

17432	6	Belagerungs-Spiel	do	do	do	12 by 13	29	do	2
17494	8871	Das Gänsespiel	Neu-Ruppin	Gustav Kühn	do	11 by 14	54	do	2
17491	8798	Das neue Gänsespiel	do	do	do	12 by 14	100	do	2
17493	5835	Das Jagdspiel	do	do	do	11 by 11	41	do	2
17490	5808	Neues Matrosenspiel	do	do	do	10 by 12	32	do	1
17495	7583	Die Reise um die Welt zu Wasser und zu Lande.	do	do	do	[1]12	41	do	1
17482	6638	Das neue Affenspiel	do	Oehmigke & Remschneider.	do	7 by 9	54	do	2
		Das neue Gänsespiel	do	do	do	7 by 9	56	do	2
17473	8455	Das neue Affen-Spiel	do	do	do	12 by 12	63	do	2
17474	8800	Das neueste Affenspiel	do	do	do	12 by 13	100	do	2
17475	8020	Neues deutsches Flaggen-Spiel	do	do	do	12 by 15	100	do	2
17465	8021	Eisenbahn-Spiel	do	do	do	12 by 15	70	do	2
17479	3067	Neues Eisenbahn- und Dampfschiff-fahrts-Spiel.	do	do	do	10 by 15	36	do	2
17475	6139	Das neue Gänsespiel	do	do	do	10 by 13	56	do	2
17476	7445	Das neue Gänse-Spiel	do	do	do	10 by 13	56	do	2
17452	9045	Neues Gänsespiel	do	do	do	11 by 11	65	do	2
17469	7063	Allerneuestes Gänse-Spiel	do	do	do	12 by 15	63	do	2
17472	7086	do	do	do	do	12 by 14	100	do	2
17453	8017	Neues Glücks-Spiel	do	do	do	12 by 13	100	do	1
17471	2015	Das Hasen-Spiel	do	do	do	12 by 12	63	do	2
17462	2793	Neuestes Jagdspiel	do	do	do	11 by 14	33	do	------
17468	6306	Das Kaiser-Spiel	do	do	do	10 by 14	30	do	1
17454	8019	Kriegs-Spiel	do	do	do	12 by 15	70	do	1
17467	9064	Allerneuestes Kriegs-Spiel	do	do	do	10 by 14	45	do	2
17458	9046	Allerneuestes Lotterie-Spiel	do	do	do	12 by 15	55	do	2
17464	8025	Das Matrosen-Spiel	do	do	do	12 by 14	40	do	1
17478	8994	Müller u. Schornsteinfegergeselle auf der Wanderschaft.	do	do	do	12 by 15	42	do	2
17477	7544	Neuestes Post- u. Reise-Spiel	do	do	do	11 by 14	44	do	2
17480	9047	Neues Reisespiel mit Kindernissen	do	do	do	10 by 14	70	do	1

[1] Round; diameter.

Games of Goose in Museum of Archæology and Paleontology, University of Pennsylvania—Continued.

Museum No.	Publisher's No.	Name.	Place of manufacture.	Publisher.	Material.	Size.	Number of houses or stations.	Implements.	Number.
		GERMAN—continued.							
17470	1512	Das Robinson-Spiel	Neu-Ruppin	Oehmigke & Remschneider.	Paper	*Inches.* 11 by 12	31	Teetotum	
17461	8018	Wer will Schwarzer Peter werden?	do	do	do	12 by 12	70	do	2
17457	6043	Der Seefahrer	do	do	do	[1]12	25	do	
17483	7055	Schulze und Müller's Wettreise durch Afrika.	do	do	do	11 by 15	48	do	
17463	7448	Neues Wetrennen-Spiel	do	do	do	10 by 15	33	do	2
17481	8023	Allerneuestes Wetrenn-Spiel	do	do	do	12 by 15	100	do	1
17445	34*g*	Affen-Spiel	Weissenburg	C. Burckardt	do	12 by 13	63	do	2
17441	1073	Neuestes Affen-Spiel	do	do	do	12 by 13	63	do	2
17443	1071	Neues Bank-Spiel	do	do	do	12 by 12	100	do	2
17450	34*a*	Blumen-Spiel	do	do	do	13 by 13	29	do	2
17439	34*f*	Eisenbahn-Spiel	do	do	do	10 by 15	36	do	2
17436	29	Gänse-Spiel	do	do	do	12 by 15	63	do	2
17435	1	do	do	do	do	14 by 19	63	do	2
17440	34*c*	Neues Gänsespiel	do	do	do	13 by 13	100	do	2
17442	1072	Neues Hasen-Spiel	do	do	do	12 by 12	73	do	2
17451	30	Hanswurst-Spiel	do	do	do	[2]15	32	do	1
17447	1074	Neues Hintz und Peter-Spiel	do	do	do	12 by 13	85	do	2
17446	1070	Neues schwarzer Peter-Spiel	do	do	do	12 by 12	70	do	2
17448	34*b*	Völker-Spiel	do	do	do	13 by 13	25	do	1
17444	1069	Neues Wettrenn-Spiel	do	do	do	12 by 13	61	do	2
17503	1	Pferdebahn-Spiel			do	12 by 15	36	do	2
17504	6	Wettennen			do	12 by 15	36	do	2
17505	7	Regattaspiel			do	12 by 15	36	do	2
17506	8	Ritterturnier			do	12 by 15	36	do	2
17509	44	Touristen-Spiel			do	12 by 15	36	do	2

17507	46	Jagd-Spiel			do	12 by 15	36	do	2
17508	47	Lustballon-Spiel			do	12 by 15	35	do	2
17496	34	Das neue unterhaltende Gänse-Speil			do	12 by 16	63	do	2
17511	6944	Die Sonntags-Jäger			do	11 by 14	63	do	1
[3]17497	1	Fuchs- und Gänse-Spiel			do	10 by 13	50	do	2
17498	2	Post und Reise-Spiel			do	10 by 13	36	do	
17499	3	Lustballon-Spiel			do	10 by 13	36	do	2
17500	4	Pferdebahn-Spiel			do	10 by 13	63	do	2
17501	5	Reise durch Europa			do	10 by 13	36	do	2
17502	6	Regatta-Spiel			do	10 by 13	36	do	2
		ITALIAN.							
17382		Il nuovo giuoco dell 'oca	Ferrara	Fratelli Melli & D. Finzi.	do	13 by 17	90	do	2
17390		Giuoco del barone	Florence	E. Ducci	do	13 by 18	76	do	
17373		Giuoco dell' oca	do	do	do	12 by 16	63	do	
17370		do	do	do	do	12 by 16	63	do	
15504		do	do	do	do	12 by 16	63	do	
17386		Giuoco dell' amore e dell' imeneo	Milan	Gio. Gussoni	do	15 by 20	80	do	2
15502		La battaglia dell 48	do	Fratelli Tensi	do	17 by 25	48	do	2
17389		Il giro del mondo	do	do	do	16 by 24	80	do	2
17385		Giuoco nuovo della lauterna magica o del disinganno	do	Antonio Vallardi	do	19 by 20	73	do	2
17387		Giuoco dell' oca	do	Orrigoni, Bianchi e Ci.	do	11 by 15	63	do	2
17388		Giuoco dell tramway	do	Fratelli Tensi	do	17 by 22	63	do	2
17392		Viaggio circolare in Italia	do	Orrigoni, Bianchi e Ci.	do	20 by 25	69	do	2
17381		Dilettevole giuoco dell' oca	Venice		do	11 by 15	63	do	2
17391		Giuoco dell 'oca			do	16 by 20	90	do	2
17372		do			do	16 by 20	90	do	2
17371		do			do	16 by 20	90	do	2
17380		do			do	12 by 16	90	do	2
17381		do			do	12 by 16	90	do	2
17377		do			do	17 by 22	90	do	2

[1] Round; diameter.

[2] Length, figure of a man.

[3] The names and rules of this and the five following games are printed in four languages—German, French, English, and Dutch.

Games of Goose in Museum of Archæology and Paleontology, University of Pennsylvania—Continued.

Museum No.	Publisher's No.	Name.	Place of manufacture.	Publisher.	Material.	Size.	Number of houses or stations.	Implements.	Number.
						Inches.			
17378	.....	Giuoco dell' oca			Paper	11 by 15	63	Dice	2
17374	.....	....do			....do	12 by 16	63	....do	2
17375	.....	....do			....do	11 by 16	63	....do	2
17376	.....	....do			....do	12 by 17	63	....do	2
17379	.....	....do			....do	11 by 15	63	....do	2
17380	.....	....do			....do	11 by 15	63	....do	2
17369	.....	Vero giuoco dell' oca		Cesare Pacifici	....do	14 by 18	63	....do	2
15941	.....	Oca Francese		Manuscript	....do	18 by 27	12	....do	.....
		JAPANESE.							
7130	.....	Nan niyo ichi dai shus-sei sugoroku	Tokyo	Tsunejiro Shimizuya	....do	17 by 20	24	.....	1
15831	.....	Kamakura ei-yu sugoroku	....do	Jingoro Wakasaya	.... do	13 by 17	28	.....	.....
15833	.....	Gakko sei-to benkiyo sugoroku	Tokyo (1884)	Kichibé Tsutsumi	....do	13 by 18	22	.....	1
17687	.....	Shina sei-batsu sugoroku	Tokyo (1894)	Hakubunkan Company.	....do	28 by 39	33	.....	.....
		KOREAN.							
17626	.....	Tjyong-kyeng-to	.....	Manuscript	....do	23 by 37	108	Long-notched wooden die, or teetotum.	1
17699	.....	Nam-seung-to	.....	....do	....do	22 by 36	120		1
17628	.....	.....	.....	....do	....do	$10\frac{1}{2}$ by $10\frac{1}{2}$	.....	Wooden dice	3
		SPANISH.							
16474	.....	Juego del laberinto	Mexico	Lit. Debray Sucs	....do	12 by 15	63+1	Dice	3
18263	.....	Juego de la oca	....do	Lit. Debray	....do	10 by 14	63	....do	2
		SWEDISH.							
17492	268	Nya Gåsspelet	Neu Ruppin	Gustav Kuhn	....do	12 by 14	100	....do	2

34. TÁWULAH. Backgammon. Damascus, Syria.

Folding board inlaid with mother-of-pearl and silver wire, dice, and men.[1] The game is played in the same manner as the common English game. The game of backgammon belongs to what I have designated, for convenience, as the *Nyout* series. Dr. Hyde has remarked that the six points upon each quarter of the backgammon board were devised to correspond with the six points of the cubical die.

35. TABAL. Backgammon. Johore, Malay Peninsula. Board.[2]

The name of this game, *tabal*, is doubtless from the Portugese *tabola* or Spanish *tabla*.

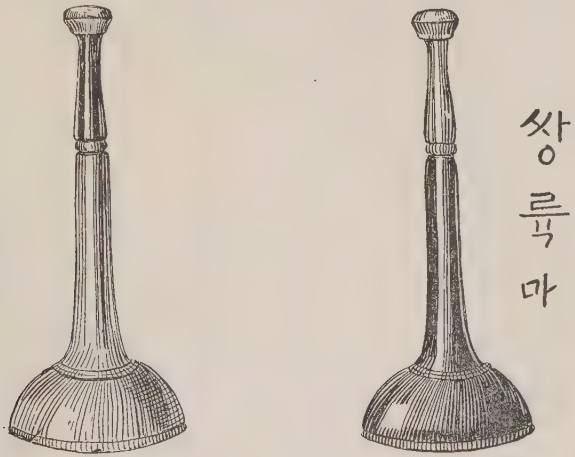


Fig. 156.

MEN FOR KOREAN BACKGAMMON GAME.

Height, 5⅝ inches.

Cat. No. 17601, Museum of Archæology, University of Pennsylvania.

The game of Backgammon, played upon a board of twenty-four stations similar to the boards in common use in Spain at the present day, exists along the entire eastern coast of Asia, from Korea to the Malay Peninsula.

36. SSANG-RYOUK. Backgammon. Korea.

Reproduction of native picture of players engaged at the game.[3]

This game is described at length in Chinese Games with Dice and Dominoes. It is played with fifteen men, according to the throws with two dice, in the same manner as the English game of backgammon. The board consists of an unpainted box, 11 by 23½ inches, with inclosing sides 3¾ inches high. The men—called *mal*, "horses," as in the *Nyout* game—are delicate wooden pins 2¾ inches high, with a hemispherical base (fig. 156). Those on one side are painted green, with red

[1] Cat. No. 7710, Mus. Arch., Univ. Penn.

[2] Cat. No. 16586, Mus. Arch., Univ. Penn. Chinese Games with Dice, fig. 10, Report U. S. Nat. Mus., 1893, p. 502.

[3] From Korean Games.

tips, and those on the other red, with green tips, agreeing in this respect with the pieces in the Hindu game of *Pachisi*, which sometimes have the green pieces tipped with red and the red with green in the same manner, as in the Burmese game (No. 41). An interesting pecul-

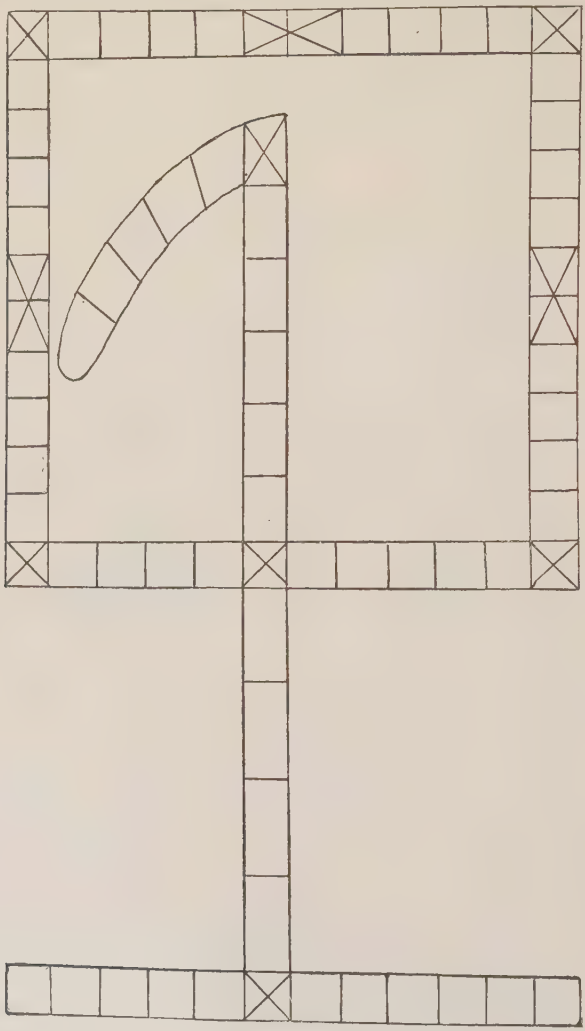


Fig. 157.

COWRIE GAME (*Kawade Kelia*).

Board, 12 by 24½ inches.

Ceylon.

Cat. No. 16471, Museum of Archæology, University of Pennsylvania.

iarity of the men is that they are each marked with the name of a famous Korean *Ki-säing*, or "singing girl," which is inscribed in Chinese characters on the bottom of each piece.

This Korean game nearly agrees with the Chinese backgammon game

described by Dr. Hyde under the name of Coan ki (*Tsun k'i*), or the "Bottle Game."[1]

37. KAWADE KELIA. Cowrie game. Ceylon. Board and cowries.[2]

The board, 12 by 24½ inches, is marked with a design cut in the wood (fig. 157). It is elevated by two strips of wood nailed transversely across the bottom, and bears a nearly obliterated diagram for the same game in blue paint. From the exhibit of the Government of Ceylon at the Columbian Exposition, Chicago. Two or four persons play. In the latter case, two play as partners. Cowries of different kinds are used as men, each player having three. These are called *bala*, "dogs" (singular, *balo*). The moves are made, according to the throws, with six cowrie shells. The counts are as follows:

6 mouths up = 6
5 mouths up = 5
4 mouths up = 4
3 mouths up = 3
2 mouths up = 2
1 mouth up = 1

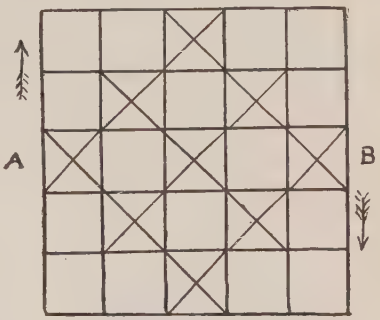


Fig. 158.
BOARD FOR "COWRIE PLAY" (*Gavalata*).
Southern India.

The players stand at opposite sides of the bottom of the board and finish at the end of the interior diagram, making the circuit in opposite directions. A player may take and set back an opponent's piece, unless it be upon one of the squares crossed by diagonals, called *cattya*. A similar game is played in southern India under the name of *Gavalata*, or "cowrie play," upon a square checkered board having an odd number of squares upon a side (fig. 158). Two or four persons play, each using one or two cowries as men, which they move according to the throws with four or five cowries.[3]

When two play, one starts at A and the other at B, moving in the direction of the arrows. The object is to traverse all the squares to the center. A player kills and sends back an opponent's piece when his own falls upon the same square, unless it rests in a protected square or "castle."[4]

These games are clearly related to the following game, *Pachisi*. The cowries used in it, as in *Pachisi*, may be regarded as a convenient substitute for staves.

38. PACHISI. The Game of "Twenty-five." India. Cloth, cowries, and men.[5]

"The implements for the game of *Pachisi*, a most popular game in

[1] De Ludis Orientalibus, Oxford, 1694, p. 65.

[2] Cat. No. 16471, Mus. Arch., Univ. Penn.

[3] A similar Hindu game is figured and described by Mr. Edward Falkener (Games, Ancient and Oriental, p. 265) under the name of *Ashta-kashte*.

[4] Children and others who can not afford cowries play with tamarind seeds rubbed smooth on one side.

[5] Cat. No. 153344, U.S.N.M.

India, consist of a cloth or board, sixteen wooden or ivory pieces or men, and seven cowrie shells. The board consists of four rectangles, with their narrow sides so placed as to form a square in the center (fig. 159). Each rectangle is divided into twenty-four small squares, consisting of three rows of eight squares each. The game is usually played by four persons, each of whom is furnished with four ivory or wooden cones called *gôte* of a peculiar color for distinction, and takes his station opposite one of the rectangles. His pieces, *gôte*, start one by one from the middle row of his own rectangle, beginning at the

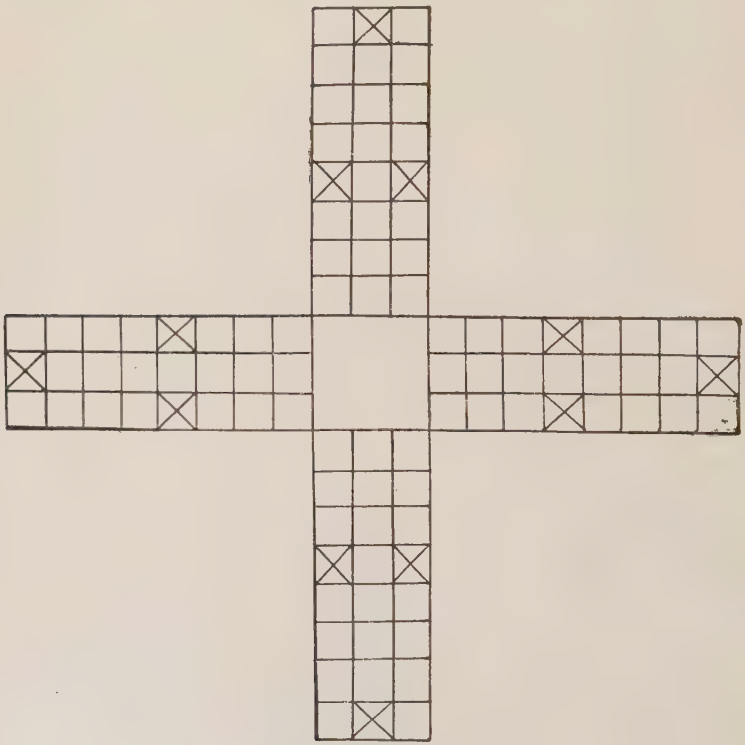


Fig. 159.

PACHISI CLOTH.

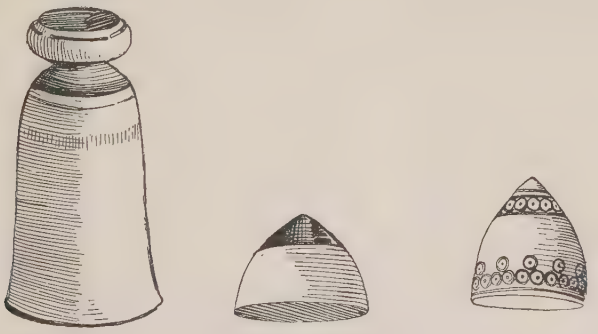
From Korean Games.

division next to the large central space. They then proceed all around the outside rows of the board, passing, of course, through those of the adversaries' rectangles, traveling from right to left (i. e., contrary to the sun) until they get back to the central row from which they started. Any piece is liable, however, to be taken up and thrown back to the beginning, as in backgammon, by any of the adversaries' pieces happening to fall upon its square, except in the case of the twelve privileged squares (called *chik*, 'forts'), which are marked with a cross; in that case the overtaking piece can not move from its position. Their

motion is determined by throwing six or seven[1] cowrie shells as dice, which count according as the apertures fall uppermost or not. The counts are as follows:

1 aperture up = 10
2 apertures up = 2
3 apertures up = 3
4 apertures up = 4
5 apertures up = 25
6 apertures up = 30
7 apertures up = 12
No apertures up = 6

A throw of twenty-five or thirty gives an additional move of one. At the last step the throw must amount to exactly one more than the number of squares left to enable the piece to go into the central space, i. e., off the board. If it happens to stop on the last square, it can not get off



a *b* *c*

Fig. 160.

MEN FOR PACHISI GAME.

a, Maldives; wood, painted. *b*, Burma; wood, painted. *c*, Lucknow, India; ivory. Height, 1¾ inches, ½ and 1⅛ inch.

Cat. Nos. 16477, 18612, 7133, Museum of Archæology, University of Pennsylvania.

until twenty-five or thirty is thrown. The players throw in turns, and each goes on until he throws a two, three, or four, when he loses the lead. If the same number be thrown thrice successively, it does not count. The game is generally played with six cowries, making the highest throw twenty-five (the six apertures up then counting twelve); hence it is termed *Pachisi* (from *pachis*, twenty-five). The board used is a carpet or some other fabric, ornamented and marked with cloth of different colors sewed upon it. It is sometimes played by two persons, each taking the opposite rectangles with eight pieces and playing them all from the rectangle next to him. The game continues till three of the players get out. They never play for money."[2]

The game of *Pachisi* may be regarded as an expansion and elaboration of the type of game represented by the Korean *Nyout*, and sacred

[1] The number of shells used as dice in *Pachisi* and allied games varies from four up to as many as sixteen.

[2] Herklots, Qanoon-e-Islam, London, 1832.

and divinatory in its origin. The board itself represents the Four Quarters of the World. Its four arms, each with eight squares, may be regarded as the four arms of the internal cross of the *nyout* circuit, each of three points extended by the four arcs, each of five points.

The position of the "castles" or squares marked with a cross on the arms is not always the same,[1] but commonly, as on the cloth from the Maldives (No. 43), they agree with the large circles at the four quarters of the *nyout* circuit.

The colors of the men agree with those assigned to the seasons of the year and the four quarters of the world to which they correspond, in Asia. When four persons play, the red and green, and black and yellow play partners. This relation is indicated on the men used in the Burmese game (No. 42), which are painted with the complementary colors, the red men having green tips, and *vice versa*. This corresponds with the relation assumed to exist between the seasons and the world quarters and their corresponding colors. As each quarter of the world has four quarters, each player in turn has four men. As the men or pieces may be regarded in the cosmical game as actually representing men, they appear as such in the Maldivian game (No. 43) like the men of the Noah's Ark. The name of the pieces, *gôte* (singular, *gôt*),[2] also applied to the pawns in chess, is derived from the Sanskrit *ghotaka*, a horse. This agrees with the Korean name of the men in *Nyout: mal*, "horse," or "horsemen."

The two faces of the Korean staves, black and white, may be regarded as signifying, as will appear in the following pages, the dual principles of nature, masculine and feminine. A feminine significance is widely attributed to the aperture of the cowrie shell. Its convex side would naturally be regarded as masculine; hence its substitution for the staves would seem to have been an easy transition.

The distribution of the game of *Pachisi* in Asia, as illustrated by specimens in the U. S. National Museum and the Museum of the University of Pennsylvania, is from Syria to the Philippines.

39. PATOLLI. A game like *Pachisi*. Ancient Mexico.

Reproduction of native picture, from copy of sixteenth century Hispano-Mexican manuscript, with kind permission of Mrs. Zelia Nuttall:[3]

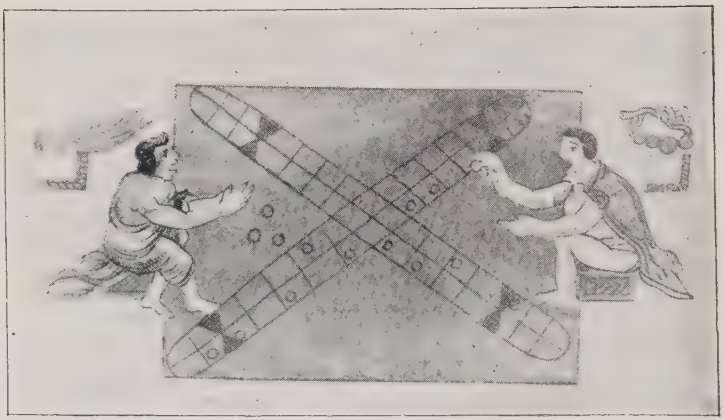
Mrs. Zelia Nuttall has kindly furnished me with the following translation of the Spanish text accompanying the picture:

This is a game that the Indians had and named *patole*. It is like a game of dice, and (played) upon a painted mat. In the following picture, and all who were mas-

[1] They are sometimes placed on the fourth square and sometimes on the fifth, varying in specimens from the same locality.

[2] The word *got*, or properly *ghot*, Bengali, *ghunti*, is obviously a corruption of the Sanskrit *ghotaka*, a horse, Bengali and Hindi *ghora*, or *ghote*. Communicated to the writer by the Swamee Vivikenanda through Mrs. Florence B. Sherman.

[3] Prospectus: Libro de la Vida que los Indios antiguamente hazian y Supersticiones y malos Ritos que tenian y guardavan. An anonymous Hispano-Mexican Man-



THE GAME OF PATOLLI.

From Atlas of Duran's Historia de las Indias de Nueva España y islas de tierra firme, Mexico, 1880, II.

ters of their games, invocated a demon which they name Macuilsucitl, which means Five Roses (flowers). They invocate him, so that he should give them luck in winning.[1]

An especial interest is attached to the game of *Patolli* from the fact of its resemblance to the Hindu *Pachisi* being regarded as one of the strongest evidences of the Asiatic origin of the old Mexican culture. Attention was first called to this resemblance by Dr. E. B. Tylor in a paper before the Anthropological Institute, entitled "The game of patolli in ancient Mexico and its probable Asiatic origin."[2]

In plate 29 may be seen a picture of *Patolli* from Duran's Atlas, the original being in colors.

An excellent résumé of the accounts of *Patolli*, as related by the chroniclers, is given by Prof. E. B. Tylor in the Journal of the Anthropological Institute,[3] and republished in the Internationales Archiv für Ethnographie.[4]

40. CHAUSAR, or PÁSÁ. Set of three ivory dice.[5] Lucknow, India.

Chausar is played upon the same board as *Pachisi*, with the substitution of three dice marked with spots counting one, two, five, and six.[6]

Either long dice (No. 13) or short ones pointed at the ends, like those here exhibited, are used.

The shorter dice are said to be used as cheaper in price. The two

uscript dating from the sixteenth century, consisting of 145 pages of illustrations and descriptive text, preserved at the Biblioteca Nazionale Centrale, Florence (Cod. Magl. Class. 111. Pal., II, Cod. 3). Published in colored facsimile with English Translation, Commentary, and Notes by Zelia Nuttall.

[1] Another picture in the same manuscript, reproduced by Mrs. Nuttall, described as the *manta de cinco rosas* (Mantle of the Five Roses), suggests the attributes of this god. It consists of a parallelogram, at the four corners of which are four circles, each of the color attributed among the Mexicans to the Four Directions.

"Xochipilli, lord of flowers, otherwise named Macuilxochitl, five flowers (the name of a small odorous plant), was the deity who gave and protected all flowering plants. As one of the gods of fertility and production, he was associated with Tlaloc, god of rains." Brinton, Rig Veda Americanus, p. 40.

[2] Journal of the Anthropological Institute, VIII, 1878. The first writer to discuss the resemblances of the games of the American Indians with those of the Old World, as an argument in favor of the Asiatic origin of the American race, was P. Lafitau in his Moeurs des Sauvages Ameriquains Comparees aux Moeurs des Premiers Temps, Paris, 1724. Under *Des Jeux* (II, p. 338) he describes and illustrates the plum stone game played upon a mat, and the bowl game, comparing them with the similar custom of throwing cowrie shells, practiced by the negroes of Africa (see p. 815), and with knuckle bones of classical antiquity. He then compares the game of straws, *pailles*, with cards, and concludes with a parallel between the Indian ball games and those of the Greeks and Romans.

[3] On the Game of Patolli in Ancient Times and its probably Asiatic Origin, 1878.

[4] On American Lot-Games as Evidence of Asiatic Intercourse before the Time of Columbus, 1896.

[5] Cat. No. 7144, Mus. Arch., Univ. Penn. Chinese Games with Dice and Dominoes, fig. 25, Report U. S. Nat. Mus., 1893, p. 532.

[6] The variations in the game called *Chausar*, played with dice, from that of *Pachisi* with cowries, are given by Mr. Edward Falkener. Games Ancient and Oriental, London, 1892.

kinds find a parallel in the long and short blocks used in the *Nyout* game and in the similar staves used in games by certain American tribes. In the case of the latter a ceremonial distinction is said to sometimes exist, one kind being used exclusively by women, who are not permitted to play with the others.

41. PASIT (*Pachisi*). Burma. Cloth, cowries, and men.[1]

Cloth with four arms, each with three rows of eight squares consisting of silk cloth of different colors.

A detailed account of *Pasit* is given by Shay Yoe.[2] The game is also called *chuay pyit-thee* and *ansah pyit-thee*. He describes six cowries (*chuay*) being used, the throws with which count as follows:

1 mouth up = 10, *t'sè*.
2 mouths up = 2, *pah*.
3 mouths up = 3, *thohn*.
4 mouths up = 4, *lay*.
5 mouths up = 25, *taseht*.
6 mouths up = 12, *bahyah*.
No mouths up = 6, *chouk*.

These, it will be seen, closely agree with those described on page 853, as do the rules in general. The "castles," called *poh* or *kyah*, are colored red or green. The game is also played with three dice, identical with those described under *Chausar* (No. 40).

42. DHOLA (*Pachisi*). Maldive Islands. Cloth, men, and cowrie shells, weighted with lead, used as dice[3] (Plate 30).

The cloth is made of blue cotton with the squares embroidered in white thread, with the date in the middle, A. H. 1301 (1883 A. D.). Five cowries are used. In Ceylon the men receive the name of *ito*.

43. PACHÎS (*Pachisi*). Persia.

Wooden board,[4] composed of four pieces which fit together in the middle to form a cross (Plate 31). The face is gilded and painted in colors. There are three rows of eight squares in each arm, with pictures of women, covered with mica, at each of the four ends. It will be observed that the game is known in Persia by its Hindu name. The method of play, if it differs from that in India, is unknown to the writer.[5]

[1] Cat. Nos. 18592, 18593, 18594, Mus. Arch., Univ. Penn.

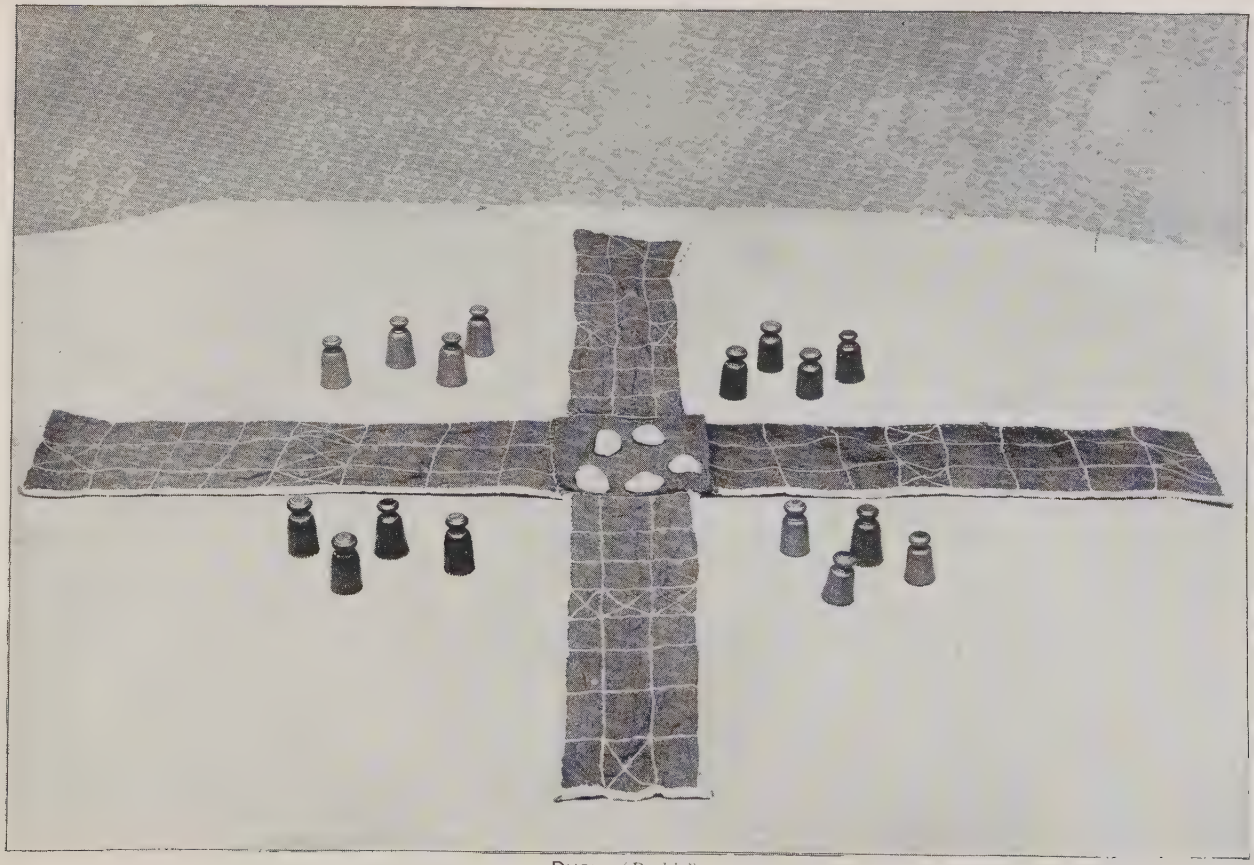
[2] James George Scott, The Burman, His Life and Notions, London, 1882, II, p. 83.

[3] Cat. Nos. 16476, 16477, 16482, Mus. Arch., Univ. Penn. From the exhibit of the Government of Ceylon at the Columbian Exposition, Chicago.

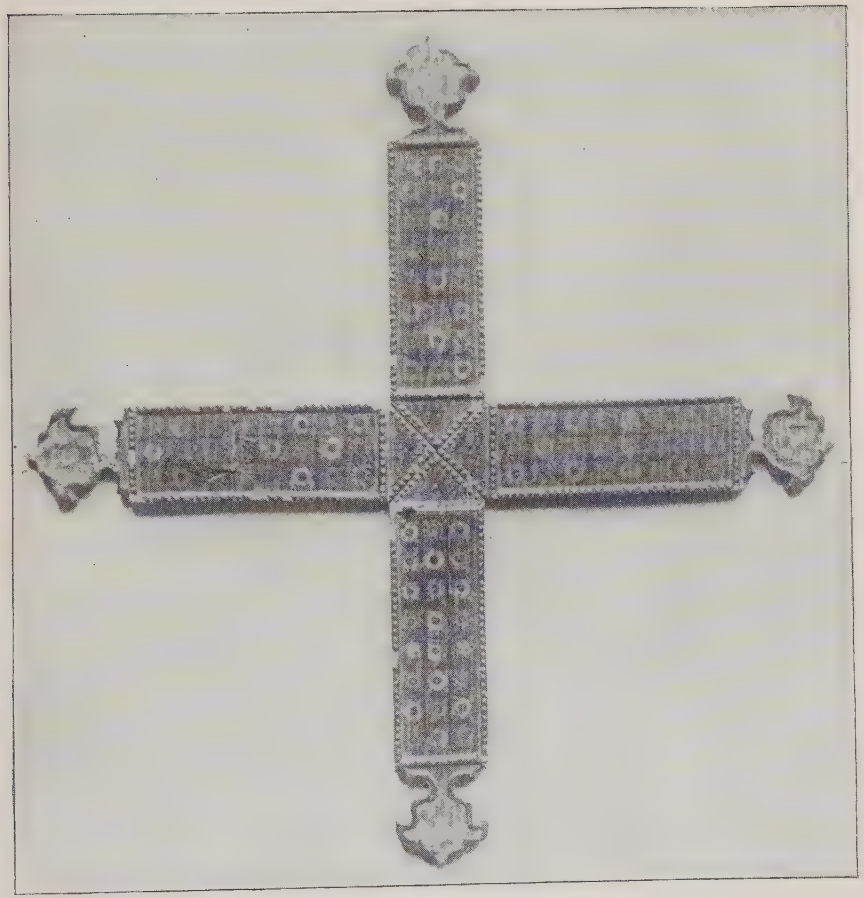
[4] Cat. No. 18264, Mus. Arch., Univ. Penn.

[5] Gen. A. Houtum Schindler, of Teheran, in reply to a letter of inquiry, writes as follows:

"*Pachisi*, an Indian game, is seldom played in Persia; in fact, I do not remember having seen it during all my twenty-nine years' residence in the country. The Persian name of the game is *Pachîs* and *Pichâs*, the latter evidently a corruption of the former, the original Indian word."



DHOLA (*Pachisi*).
Width, 38 inches.
Maldive Islands.
Cat. No. 16176. Museum of Archæology, University of Pennsylvania.



BOARD FOR PACHIS (*Pachisi*).
Length, 20½ inches.
Persia.
Cat. No. 18264, Museum of Archæology, University of Pennsylvania.

44. EDRIS A JIN. Edris of the Genii, a game like *Pachisi*. Druses of Lebanon, Syria. Cloth and cowrie shells used as dice and men.[1]

The board is much more complicated than the preceding, consisting of a large square cotton cloth marked with a parti-colored diagram with four arms each having four rows of eight squares, each connected at the ends by a diagonal row of eight squares, the whole forming an octagonal figure. The inner square, composed of sixteen small squares, is called the *serai*. The moves are made according to the throws with four cowries. Each player has three men, other shells, one of which is called the "chief," and the others "soldiers." The former are filled with red sealing wax, to which colored paper is pasted, distinguishing them as red, green, yellow, and black. The name of the game, *Edris*, which is applied in Syria to simple games played with men upon boards, among which is Merrels, is the same as that of Enoch,[2] the prophet of the Druses.

In this game, which, from its terminology, is possibly of Persian origin, the pieces are differentiated. It appears to be a step in the direction of the game of chess, although not in the direct line.

45. CHATURANGA. Dice chess. Ancient India. Board, men[3] (reproductions) and die.

The game of *Chaturanga*, now apparently extinct, is described in detail in the *Bhavishya Purana*, of which translations have been given by several writers. It was played upon an ordinary chessboard of sixty-four squares by four players, each of whom had eight men, distinguished by the colors red, green, yellow, and black. The men consisted of four foot soldiers or pawns, and a Rajah, Elephant, Horse, and Ship, which are placed in the order of Ship, Horse, Elephant, and Rajah, beginning from the left corner, with the four foot soldiers in front. The partners' pieces occupy the opposite diagonals. The Rajah, Elephant, and Horse move as the King, Rook, or Castle and Knight in modern chess; the Ship always two squares diagonally, hopping over an intermediate piece if necessary; the foot soldier like the pawn in our own game. The players play alternately in the order of the sun. The moves were made according to the throws with a die marked 2, 3, 4, 5. On throwing 5, the Rajah or a foot soldier was moved; if 4 was thrown, the Elephant; 3, the Horse, and 2, the Ship. It is not certain from the account referred to that the die was employed after the opening move.

The Rajah was not checkmated in this early game, but is taken like

[1] Cat. No. 18262, Mus. Arch., Univ. Penn.

[2] Enoch is the reputed inventor of a kind of divinatory table divided into squares, in each of which is written an Arabic letter, which is described by Lane under the name of *Za'ir'yeh*. Hence, it may be, his name is applied to the games above described.

[3] Cat. No. 7578, Mus. Arch., Univ. Penn.

any other piece. He might, if expedient, be captured by his partner's men, who thus placed himself in command of both armies.

The name of the game, *Chaturanga* or "four angas," is that of the four *angas* or members of an army, a term which is applied to real armies by the epic poets of India.[1]

The relation of the game of *Chaturanga* to the game of *Pachisi* is very evident. The board is the square of the arm of the *Pachisi* cross, and even the castles of the latter appear to be perpetuated in the camps, similarly marked with diagonals, on the Chinese chessboard (No. 51).[2] The arrangement of the men at the corners of the board survives in the Burmese game of Chess (No. 46). The four-sided die is similar to that used in *Chausar* (No. 40). The pieces or men are of the same colors as in *Pachisi*, and consist of the four sets of men or pawns of the *Pachisi* game, with the addition of the four distinctive chess pieces, the origin and significance of which remain to be accounted for. By analogy, it may be assumed that the board, if not indeed all boards upon which games are played, stands for the world and its four quarters (or the year and its four seasons), and that the game itself was originally divinatory.

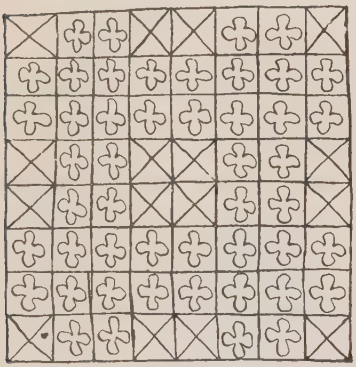


Fig. 161.

PERSIAN CHESS BOARD.

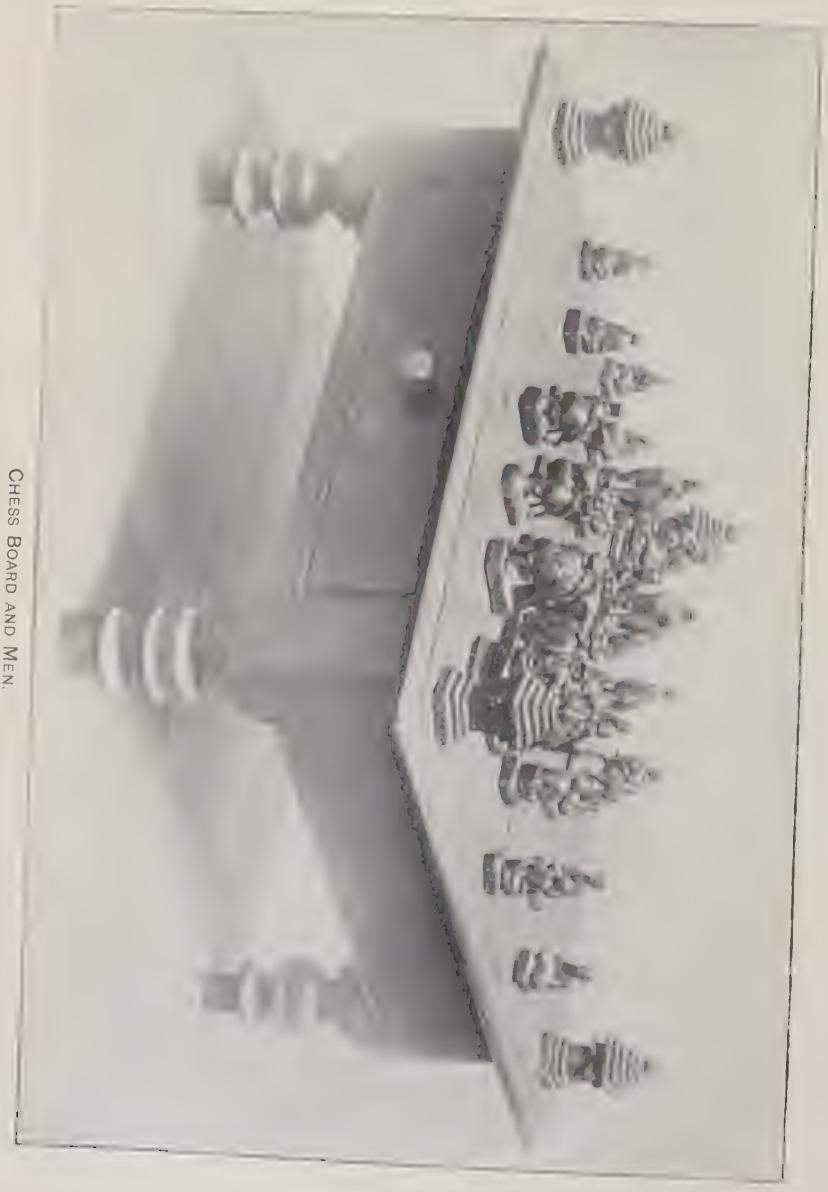
After Hyde.

The theory that modern chess had its origin in *Chaturanga*, suggested by Capt. Hiram Cox in 1799, and upheld and developed by Prof. Duncan Forbes[3] has not been accepted by students of the game generally. The antiquity of the *Purana* in which it is described, has been questioned, and the game asserted to be a comparatively modern adaptation of the primal Hindu game. Apart from this discussion the relation of Chess to an earlier dice game, such as *Pachisi*, appears to be evident. The comparative study of games leads to the belief that practically all games as chess, played upon boards, were preceded by games in which the pieces were animated by dice, cowries or knuckle bones, or by staves, as in the Korean *Nyout*, the Egyptian *Táb*, and many aboriginal American games.

[1] For a further account of the game with a translation of the original authorities, consult Edward Falkener, Games Ancient and Oriental, London, 1892, from which the above is taken.

[2] This survival of the Castles on the chessboard is still more clearly seen on the Persian chessboard figured by Hyde, fig. 161. He says: "The chessboard of the Persians living in India is quite square and has the same number of squares. But, in order better to protect the King, some of the squares are 'crosscut.' If now the King is hard pressed, he can evade either by changing with the Castle, or move to one of those crosscut squares." (Historia Shahiludii, p. 60.) A similar marking is to be observed on the Burmese chessboard.

[3] History of Chess, 1860.



CHESS BOARD AND MEN.

Burma.

Cat. No. 166539, U.S.N.M.

46. CHIT-THAREEN. Chess. Burma. Board and Men.[1] (Plate 32.)

The board is very large and stands high for the convenience of the players, who sit upon the ground. The men are made of wood of different colors, or of ivory painted red and green on opposite sides, and carved to represent the objects they stand for.

The pieces on each side are as follows:

1. *Meng*,[2] King or General (1) = King.
2. *Chekoy*, Lieutenant-General (1) = Queen.
3. *Ratha*, War Chariots (2) = Rooks.
4. *Chein*, Elephants (2) = Bishops.
5. *Mhee*, Cavalry (2) = Knights.
6. *Yein*, Foot-soldiers (8) = Pawns.

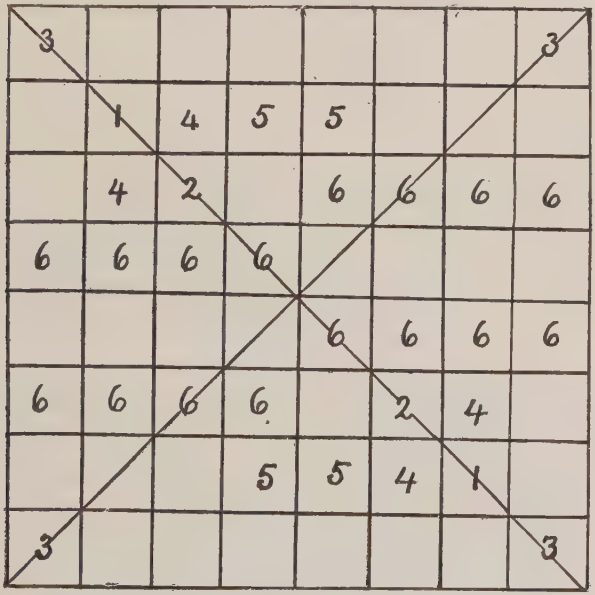


Fig. 162.

BURMESE CHESS BOARD.

From drawing in The Burman, II, p. 72.

The King, *Ratha* or Rooks, *Mhee* or Knights, and *Yein* or Pawns move in the same manner as the corresponding pieces in our own game. The *Chekoy* moves diagonally only, but one square at a time. The *Chein* move one square diagonally, but are able to move, but not to take, one square forward. The pieces are ordinarily arranged as shown on the board (fig. 162), but either party may adopt another line of battle.[3]

The absence of a queen, designated as such, will be observed in all

[1] Cat. No. 166539, U.S.N.M. Collected by Mr. C. C. Ellis, Acting United States Consular Agent.

[2] Mr. Scott (Shway Yoe) gives the following transliterations of the names of the pieces: *Mín, si'kè, yittah, sin, myin, nè.* (The Burman, His Life and Notions, London, 1882, II, p. 72.)

[3] For a more complete account of the game, consult Games Ancient and Oriental.

the oriental games of Chess. Professor Forbes has pointed out that in the four-handed game of Chess it was of the utmost importance with each of the players to get possession of his ally's throne, a step which thenceforth secured to him the individual command of the allied forces.

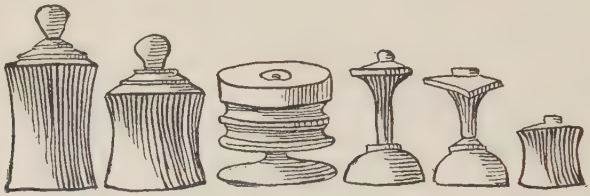


Fig. 163.
INDIAN CHESSMEN OF WOOD.
After Hyde.

It must therefore have often happened that, after some twenty or thirty moves, the contest remained to be decided between two players

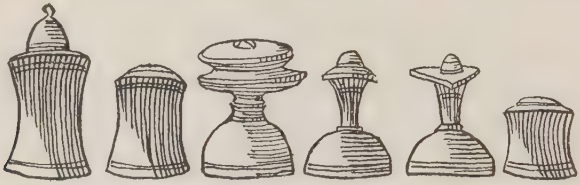


Fig. 164.
INDIAN CHESSMEN OF SOLID IVORY.
After Hyde.

only. He points out, too, that in the two-handed game one of the allied kings becomes a subordinate pièce, called by the Persians and Arabs, *Farzin* or *Wazir*, the Queen of our European game.

Fig. 165.
INDIAN CHESSMEN OF HOLLOW IVORY.
After Hyde.

47. CHESS. Maldive Islands. Board[1] and men.[2] (The men original, the board substitution.)

Identical with the Hindu game, which is played in the same manner as the English. The pieces in the Indian game receive the following names:

Padshah (1)	= King.
Wazir or Minister (1)	= Queen.
Phil or Elephant (2)	= Bishops.
Asp, ghora (2)	= Knights.
Rukh, burj (2)	= Castles.
Piadah (8)	= Pawns.

[1] Cat. No. 7579, Mus. Arch., Univ. Penn.
[2] Cat. No. 16489, Mus. Arch., Univ. Penn.

It may be observed that the forms of the chessmen in countries under Mohammedan influence are not usually those of men or animals, as such representations are forbidden by Mohammedan law.[1]

Probably the oldest chessmen known to exist are an almost complete set which is preserved in the East Indian Museum, London. They were excavated about thirty years ago on the site of the city of Brahmunabad in Sind, which was destroyed by an earthquake in the eighth

Fig. 166.
TURKISH AND GREEK CHESSMEN.
After Hyde.

century. They are black and white, made of ivory and ebony; turned, and plain in character, without ornament. The kings and queens are about 3 inches high, the pawns 1 inch, and the other pieces of intermediate heights. Fragments of a chessboard of the same materials were found with them.[2]

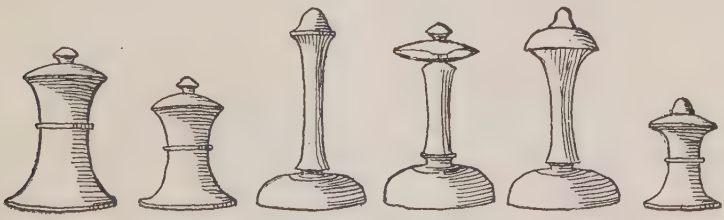


Fig. 167.
KURDISH CHESSMEN.
Height, 1 to 1¾ inches.
Cat. No. 19683, Museum of Archæology, University of Pennsylvania.

48. CHATOR. Chess. Johore, Malay Peninsula. Board and men.[3]

Identical with the Indian game. The pieces on each side receive the following names:

Rajah, (1)	= King.
Muntrie, Vezir (1)	= Queen.
Teh, Chariot (2)	= Rook.
Gejah, Elephant (2)	= Bishop.
Kuda, Horse (2)	= Knight.
Bidak, Foot-soldier (8)	= Pawn.

They are made of wood of two kinds, of the natural colors.

[1] Some commentators have supposed that the prohibition of images in the Koran referred to chessmen, and the notion, repeated in a note to Sale's Koran, has found wide acceptance. There is no evidence that chess was known to the Arabs in the time of Mohammed.

[2] William Maskell, Ivories, Ancient and Medieval, London, 1875, p. 78.

[3] Cat. Nos. 16490, 16489, Mus. Arch., Univ. Penn. From the exhibit of H. H. the late Sultan of Johore at the Columbian Exposition, Chicago.

49. CHESSBOARD.[1] Morocco. Nineteenth century.

The alternate squares are made of eight-pointed stars carved in relief and painted red with a conventional flower in yellow. The depressed squares are painted yellow.

50. CHESS. England. Board and men.[2]

The time of the introduction of chess into Europe has not been definitely fixed upon, but is believed to be in or before the Eleventh century. The source of the European game is Arabic, which is evident

Fig. 168.

ENGLISH CHESSMEN.

Time of Caxton.

After Hyde.

from the words "check" and "mate," which are from *Shah mat*, the *Shah* or King is dead. Nothing is really known as to how chess was introduced into western and central Europe.[3]

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[1] Cat. No. 15498, Mus. Arch., Univ. Penn. Purchased by the writer in Gibraltar, Spain, 1893.

A similar board was procured by Dr. Talcott Williams in Morocco in 1897. He informed the writer that he was unable to obtain the native men, foreign chessmen being used.

[2] Cat. No. 7091, Mus. Arch., Univ. Penn.

[3] In reply to a letter of inquiry, in reference to the best modern works in English and German on the practice and history of chess, Mr. John G. White, of Cleveland, Ohio, has kindly furnished the writer with the following particulars:

The best books in English as to the practical part of the game I think to be:

E. Freeborough, Chess Openings, Ancient and Modern, 3d ed., 1896, supplemented by—

E. Freeborough, Chess Endings, London, 1891.

W. Cook, Synopsis of Chess Openings; with American inventions in Chess Openings and fresh analysis since 1882, by J. W. Miller, Cincinnati, 1884.

In German:

Bilguer Handbuch, 7th ed., Leipzig, 1891.

O. Cordel, Fuhrer durch de Schachthcore, Berlin, 1888.

Dr. Eugen V. Schmidt, Systematische Anordnung der Schacheröffnungen, Leipzig, 1895.

As to the historic study of the game, there is nothing in the English language worthy of mention. Forbes' History is antiquated. He did not even make good use of the material known to him.

In German:

Dr. A. Van der Linde, Geschichte und Literatur des Schachspiels, two vols., Berlin, 1874; Quellenstudien, Berlin, 1881; Erstes Jahrtausend, Berlin, 1881.

Stimulated by these books, a number of articles by German scholars have appeared,

The oldest European chessmen in existence appear to be six ivory pieces, long preserved in the abbey of St. Dennis and now in the National Library at Paris, where they were transferred at the Revolution. According to tradition, they were a gift to the abbey from Charlemagne. The dress and ornaments of these pieces are in keeping with the Greek costume of the ninth century.[1]

51. TSÉUNG K'Í. Chess. Canton, China. Board[2] and men.

The board, commonly made of paper, has sixty-four squares, which are separated into two parts in the middle by a blank space, the width of one square, called the "River." Four squares in the middle of each side of the board in the first and second rows nearest the edge are crossed with two diagonal intersecting lines, marking an inclosure, which is called the "Palace." The pieces on each side, which are placed at the intersections of the lines instead of on the squares, and consist of disks of wood inscribed on both sides with the Chinese character for the name, distinguished by the colors red and blue, are as follows:

Tséung, "General" (1)	King.
Sz', "Councillors" (2)	Bishops.
Tséung, "Elephants" (2).	
Má, "Horses" (2)	= Knights.
Ch'é, "Chariots" (2)	= Castles.
P'áu, "Cannons" (2).	
Ping and *Tsut* (on opposite sides), "Foot soldiers" (5)	= Pawns.

The "Generals" are placed in the middle of each outer row with the "Councillors" on either side. Next without them are the two "Horses" with the "Chariots" in the corners. The "Cannons" occupy the first points of intersection from the edges of each of the second rows, while the "Footsoldiers" are placed in the third row with one intervening point between each of them.

The "General" is not permitted to move outside of his "Palace" and only along the perpendicular and horizontal lines. The "Chancellors,"

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some in periodicals devoted to the game, in learned journals, and as essays, such as that by Fritz Strohmeyer on "Chess in Old French" in the collection of essays published on the occasion of the twenty-fifth anniversary of the professorship of Dr. Adolf Tobler, Halle A. S., 1895. While these have, here and there, corrected a date, established matters doubted by Van der Linde, and enlarged the information given by him, they have left substantially unchanged the more important features of his work. Thus they have shoved back the date of knowledge of chess among the Arabs a generation, have shown knowledge of chess in Europe some fifty years before the earliest date assigned by him; proved that he spoke too quickly as to the Problem Collection of Bonus Socius comprising the whole problematical chess literature of the Middle Ages, etc. His books are somewhat disfigured by controversial bitterness, and too great critical skepticism; the style is not attractive, but they are mines of information.

[1] William Maskell, Ivories, Ancient and Medieval, London, 1875, p. 77.

[2] Cat. No. 16434, Mus. Arch., Univ. Penn.

which move along the diagonal lines, also never quit the "Palace," although other pieces may enter or pass through it. The "Elephants" move two squares diagonally, but can not jump over an intermediate piece nor cross the "River." The "Horse" has the move of our Knight, but may not jump over an intermediate piece. It may cross the "River," the "River" forming one-half of its move. The "Chariot"

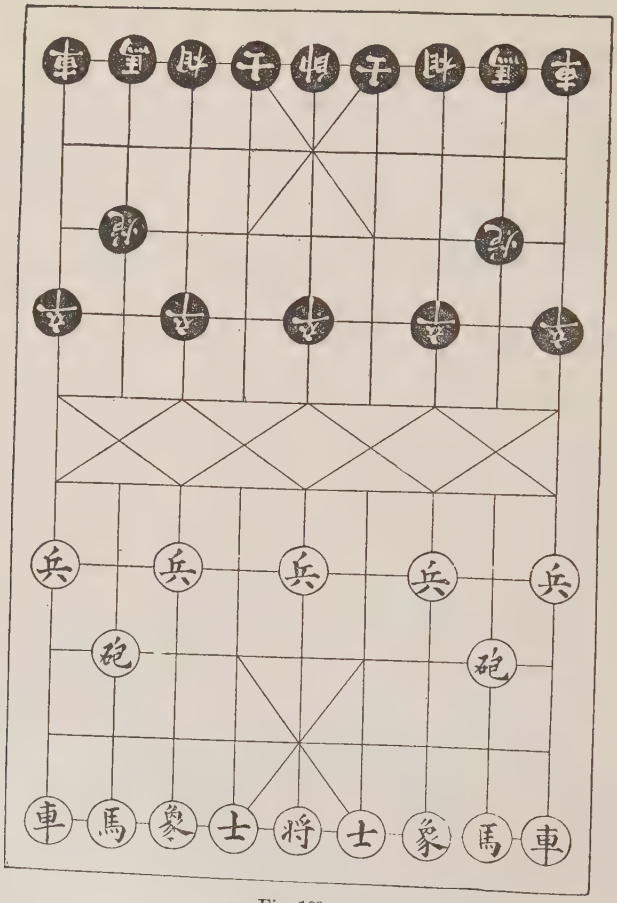

Fig. 169.
CHINESE CHESS.
From Korean Games.

moves like our "Castle," and may cross the "River." The "Cannons" move like the "Chariot," except that they can not move without jumping over one piece, but they can not jump over two. The "Footsoldiers" move and take one point at a time in a forward direction. They can cross the "River," the "River" itself being one move. When across, they can move and take either in a forward or lateral direction.

On reaching the opposite end they can move and take only laterally. The "Generals" may not face each other without intervening pieces. The object of the game is to checkmate the "General."[1]

The name of the Chinese game of Chess, *Tséung k'i*, signifies the General's Game. It is regarded by them as having been invented by Wu Wang, B. C. 1169–1116, the founder of the Chow dynasty.

The name *k'i*, which is applied by the Chinese to a great variety of games played with men or pieces upon boards, appears to refer especially to the counters. "The relations of the Chinese game to the Indian game are obscure. It was probably introduced at a comparatively early time from India. The manner of placing the men, at the intersections of the lines instead of upon the squares, constitutes one of the principal points of difference."[2]

Himly, in discussing the origin of Chinese Chess, expresses the opinion that while the game of chess had forerunners the real game originated in India as an effigy of war, and spread from India in the sixth or seventh century to the west to Persia, and to the east to Cambodia, where, as well as in Persia, the name is evidently derived from the Sanskrit *Chaturanga* (the four army divisions). In the Chinese game the names of neither the board, the game, nor the men point to a foreign origin, nor does tradition say anything about it. Himly states that the first sure trace of chess in China occurs in the Yew kwaé lŭh,[3]

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[1] For a more detailed account, consult Games, Ancient and Oriental; and for examples of games, W. H. Wilkinson, A Manuel of Chinese Chess, Shanghai, 1893.

Additional bibliography:

K. Himly, The Chinese Game of Chess as Compared with That Practiced by Western Nations, Jour. N. C. Branch, R. A. S., for 1869 and 1870, No. VI.

———, Streifzüge in das Gebiet der Geschichte des Schachspieles. Zeitschrift d. deutschen morgenländischen Gesellschaft, XXIII, p. 121.

———, Das Schachspiel der Chinesen. Zeitschrift d. deutschen morgenländischen Gesellschaft, XXIV, p. 172.

———, Anmerkungen in Bezichung auf das Schach-und andere Brettspiele. Zeitschrift d. deutschen morgenländischen Gesellschaft, XLI, p. 461.

———, Morgenländisch oder abendländisch? Zeitschrift d. deutschen morgenländischen Gesellschaft, XLIII, XLIV.

———, Die Abteilung der Spiele im Spiegel der Mandschu-Sprache. T'oung Pao.

H. G. Hollingsworth, A Short Sketch of the Chinese Game of Chess, called Kh'e. Also called Seang Kh'e, to distinguish it from Wei-Kh'e, another game played by the Chinese, Jour. N. C. Branch, R. A. S., N. S., III, December, 1866.

Thomas Hyde, Historia Shahiludii, Oxford, 1695, p. 158.

Antonius Van der Linde, Geschichte und Literatur des Schachspiels, Berlin, 1874, I, pp. 85–94.

Z. Volpicelli, Chinese Chess, Jour. N. C. Branch, R. A. S., XXIII, No. 3.

O. Von Möllendorff, Schachspiel der Chinesen, Mittheilungen der deutschen Gesellschaft für Natur- und Völkerkunde Ostasiens, II, ii.

Das schachähnliche Brettspiel der Chinesen, Deutsche Schachzeitung, Leipzig, 1891, März–Juli.

[2] W. H. Wilkinson, A Manual of Chinese Chess, Shanghai, 1893.

[3] A. Wylie, Notes on Chinese Literature, Shanghai, 1867, p. 155.

a book containing fairy tales by Nêw Tsăng-joô, written near the end of the eighth century.

52. TJYANG-KEUI. Chess. Korea.

(*a*) Board and men.[1]

(*b*) Reproduction of native picture of the game.[2]

Korean chess is admittedly a variant of the Chinese. The design of the board is the same, but in the Korean game the files are carried across the "River," which is, in fact, ignored. The pieces, which are

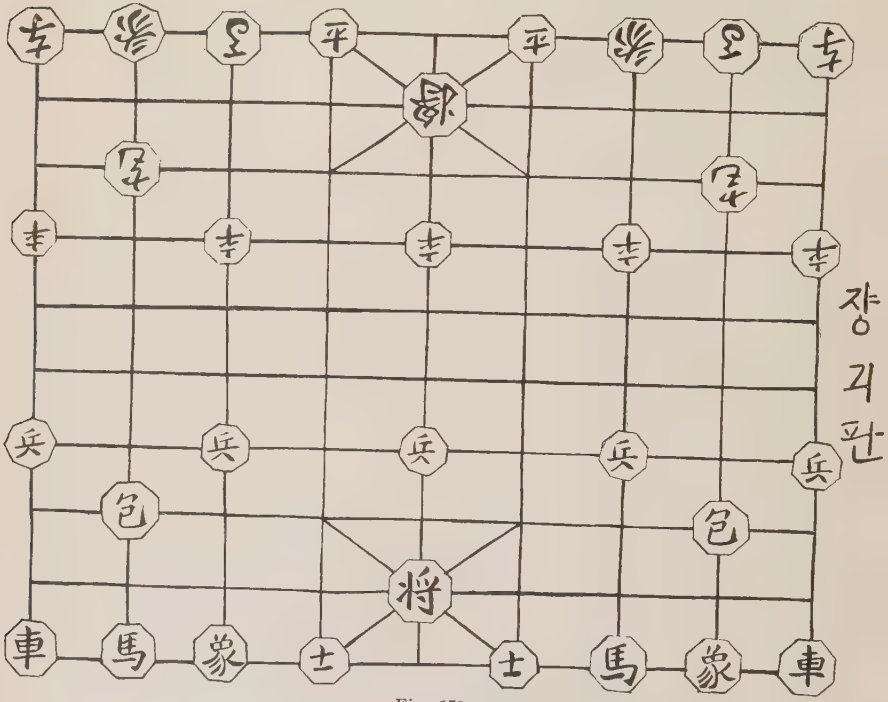

Fig. 170.

KOREAN CHESS.

From Korean Games

not circular as in China, but octagonal, and vary in size according to their value, receive the following names:

Tjyang, "General" (1)	= King.
Să, "Councillors" (2)	= Bishops.
Syang, "Elephants" (2).	
Ma, "Horses" (2)	= Knights.
Tcha, "Chariots" (2)	= Castles.
Hpo, "Cannons" (2).	
Pyeng and *tjol*, "Foot soldiers" (5)	= Pawns.

[1] Cat. Nos. 167565, 167561, U.S.N.M. Collected by Augustine Heard.

[2] From Korean Games.

For a detailed account of the game see W. H. Wilkinson in Korean Games.[1]

53. SHOGI. Chess. Japan.

(*a*) Board[2] and men.[3]

(*b*) Photograph of chess players.

The Japanese chessboard consists either of a small table, on four feet, or a paper diagram. It is a square of nine or eighty-one squares, which are slightly oblong in form. The pieces are placed in the squares, not on the intersections as in China. They consist of punt-shaped pieces of wood of different sizes, lying flat upon the board, not upright, and slightly inclined toward the front; the directions of the point determining to whom the piece belongs. Unlike all other games of

Fig. 171.

CHESS PLAYERS.

Japan.

After native drawing by Boku-sen, reproduced in Korean Games.

chess, the men are all of one color, and thus the same pieces serve for the player and his adversary. Another peculiarity is that any piece taken up may be entered by the adversary in any vacant place he chooses, and at any time he thinks desirable to enter it, such entry constituting his move. The names of the pieces on each side are as follows:

O shō, "General" (1)	= King.
Kin shō, "Gold Generals" (2).	
Gin shō, "Silver Generals" (2).	
Hisha, "Flying Wagon" (1)	= Castle.
Kakkō, "Angle going" (1)	= Bishop.
Keima,[4] (2)	= Knights.
Kyōsha, "Fragrant Chariots" (2).	
Hōhei, "Foot soldiers" (9)	= Pawns.

[1] Bibliography: W. H. Wilkinson, Chess in Korea, Pall Mall Budget, December 27, 1894; *Idem*, The Korean Repository.

[2] Cat. No. 93218, U.S.N.M. Deposited by the Corcoran Art Gallery.

[3] Cat. No. 7088, Mus. Arch., Univ. Penn.

[4] Written with the Chinese characters *kwei má*, which may be translated "honorable horse."

The *O Shō*, or "General," stands in the center of the first row. He moves one square in any direction and loses the game when checkmated. The "Gold Generals" stand on either side of the King and move one square in any direction, except the two back diagonals.

The "Silver Generals" stand on each side next to the "Gold Generals" and move one square in any direction, except sideways and backward. The *Keima* stand next to the "Silver Generals" and have our Knight's move, but only forward. The *Kyōsha* occupy the extreme ends and move any number of squares, perpendicularly only. The *Hisha* stands in front of the right-hand *Keima* and has the move of our Castle. The *Kakkō* stands in front of the left-hand *Keima* and has the move of our Bishop. The "Foot soldiers," or Pawns, occupy the third row, and move and take one square forward only.

The three rows nearest each side constitute the opposing camps. The "King" and "Gold Generals" retain their rank unchanged throughout the game, but the following pieces are promoted immediately upon entering the enemy's camp, when they are turned over, their new names being written on their reverse sides:

The *Hisha* becomes *Ryo-wo*, "Dragon King," and has the privilege, in addition to its former power, of moving one square diagonally like the *Kakkō*. The *Kakkō* becomes *Ryo-ma*, "Dragon Horse," and has the additional power of moving one square forward, sideways, or backward, like the *Hisha*. The "Silver Generals," *Keima*, *Kyōsha*, and *Hōhei*, or Pawns, can all attain the rank of "Gold Generals."[1]

54. Pa-tok. Pebble Game. Korea.

(*a*) Board and men.[2]

(*b*) Reproduction of native picture of the game.[3]

The Korean game of *Pa-tok* is identical with the famous Chinese game of *Wai k'i*, or "Game of Inclosing" (*wai*, "to inclose"), which is popular in Japan under the name of *Go*[4] (No. 56).

It is played by two players upon a board special to the game, with two sets of men of different colors (fig. 172). The board is divided into squares of uniform color, 18 by 18, numbering therefore three hundred and twenty-four. The pieces are played on the intersection of the hori-

[1] For a detailed account of the game consult Games Ancient and Oriental, from which the above is taken.

Additional bibliography:

Francis L. Hawks, Narrative of an Expedition of an American Squadron to the China Seas and Japan under Command of Commodore M. C. Perry, Washington, 1856, I, p. 465.

(Description, with drawing of board, by Dr. Daniel G. Greene.)

K. Himly, Das japanische Schachspiel, Zeitschrift d. deutschen morgenländischen Gesellschaft, XXXIII, p. 672.

V. Holtz, Japanisches Schachspiel, Mittheilungen d. deutschen Gesellschaft f. Natur- und Völkerkunde Ostasiens I, V, Heft, 10.

Antonius Van der Linde, Geschichte und Literatur des Schachspiels, I, pp. 94–96.

[2] Cat. No. 167564, U.S.N.M.

[3] From Korean Games.

[4] In Manchu it is called *Tonio*, and the board on which it is played *Toniko* (Himly).

zontal and vertical lines, and as there are nineteen lines in either direction, the number of places on which the men can be played is 19 by 19= three hundred and sixty-one.

The Korean board is made in the form of a small hollow table, differing from the Japanese board, which consists of a solid block of wood. In China the boards are printed on paper. The men used in Korea are small, polished, black pebbles and irregular pieces of white shell. The players place their men alternately on any of the points of intersection of the horizontal and vertical lines not already occupied, the object of the game being to occupy as much of the board as possible,

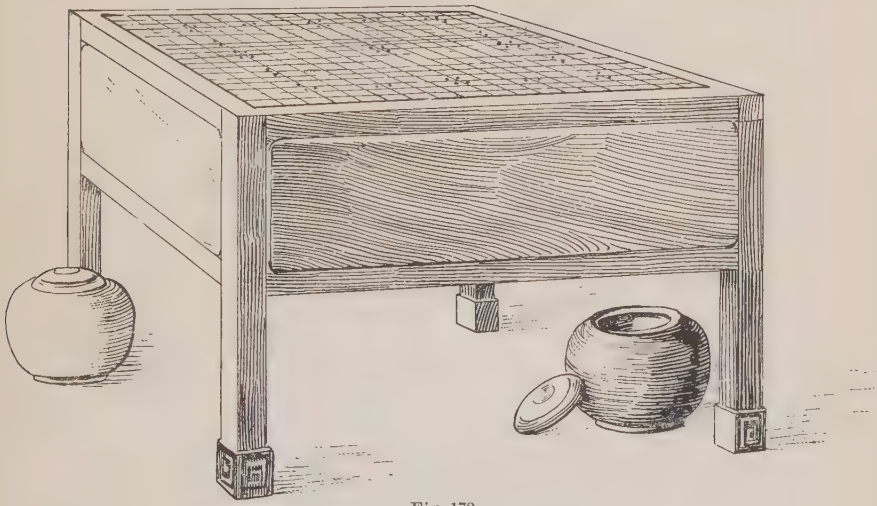

Fig. 172.

BOARD FOR PA-TOK.

Height, 11 inches; 16½ inches square.

Korea.

Cat. No. 16431, Museum of Archæology, University of Pennsylvania.

From Korean Games.

victory being decided in favor of the player who has command of the most spots. Space can be occupied in two ways: by placing men on the different points, and by forming an inclosure with one's men, the space thus contained being reckoned as one's territory. The latter gives the Chinese name to the game.[1]

The invention of the game of *Wai k'i*, of which some of the most interesting characteristics are exemplified in the Korean *Pa-tok*, is attributed by the Chinese to the Emperor Yao (B. C. 2356), or, according to other

[1] For an account of *Wai k'i*, see Z. Volpicelli, Journal of the China Branch of the Royal Asiatic Society, XXVI, p. 80, Shanghai, 1894; also:

Herbert A. Giles, Wei-Ch'i; or the Chinese Game of War, Temple Bar, XLIX, p. 194. Reprinted in Historic China and Other Sketches, London, 1882, p. 330.

K. Himly, Die Abteilungen der Spiele im Spiegel der Mandschusprache, T'oung Pao, VII, p. 135.

Thomas Hyde, De Ludus Orientalibus, Oxford, 1694, p. 195.

accounts, to the Emperor Shun (B. C. 2255). It is reputed as the first of games in China, Korea, and Japan, and one of the few which receive the approbation of the educated classes in those countries. Simple as the game appears, it embodies certain complex elements based upon primitive notions of the universe, which, although they may in part be secondary and late additions, are of the highest interest. Thus the pieces, black and white, are regarded as representing the night and the day; the four "angles" the four seasons, and the three hundred and sixty-one points of intersection on the board (360 + 1) the number of days in the year. Nine stations at the intersections, which are

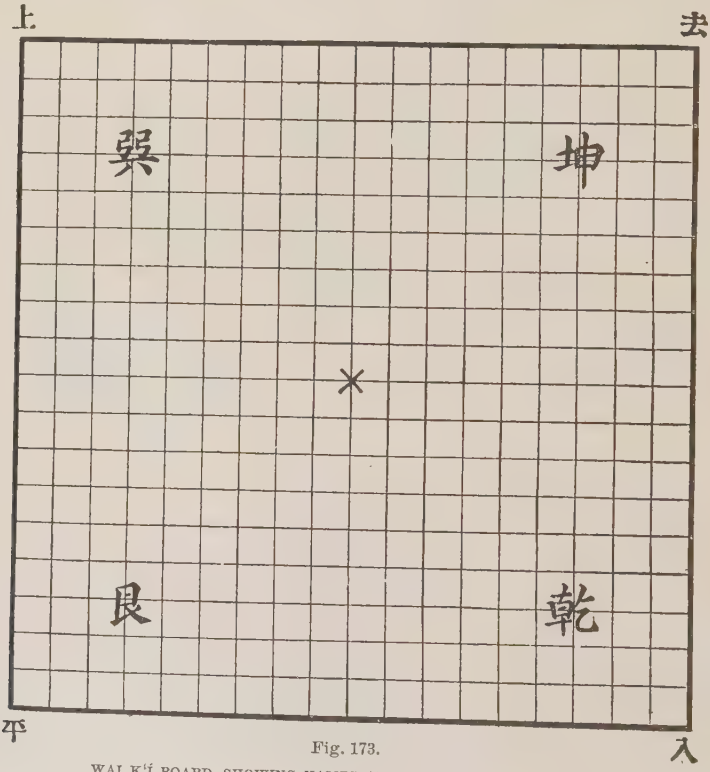

Fig. 173.

WAI K'Í BOARD, SHOWING NAMES APPLIED TO FOUR QUARTERS.

(After Volpicelli.)

marked with spots upon the board, are, in the same manner, said to correspond with the Nine Lights of Heaven (the Sun, Moon, and the seven stars of the Dipper).

The Chinese in the books which treat of the game divide the board into four equal parts, which they call "corners," and which they designate by the names of the four tones in the spoken language:

P'íng, for the lower left-hand corner;
Shéung, for the upper left-hand corner;
Hü, for the upper right hand corner;
Yap, for the lower right-hand corner.

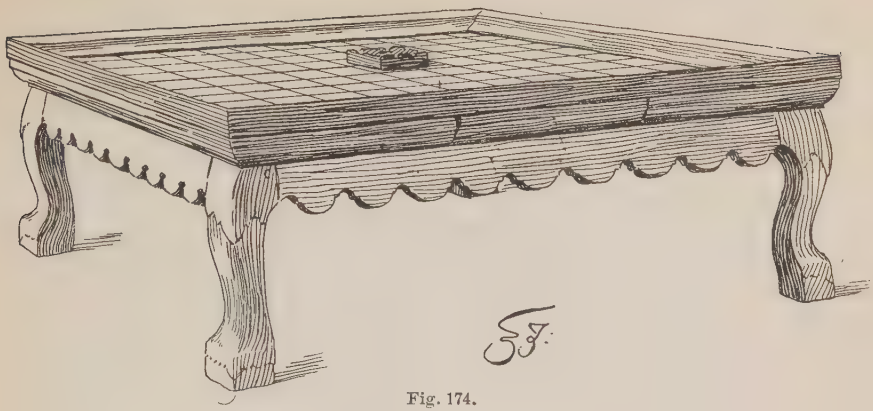

Fig. 174.

BOARD FOR CHUKI.

Height, 6¼ inches; 16 inches square.

Johore, Straits Settlements.

Cat. No. 16622, Museum of Archæology, University of Pennsylvania.

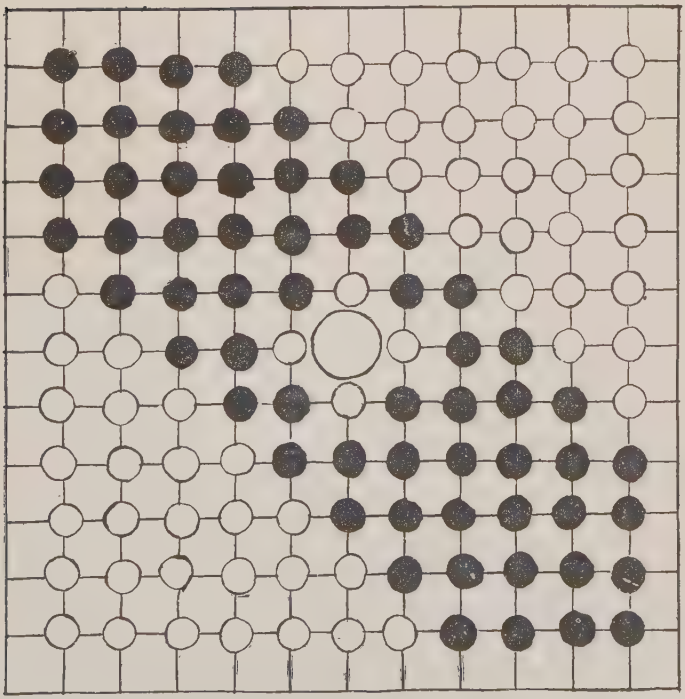

Fig. 175.

ARRANGEMENT OF MEN ON CHUKI BOARD.

In each of these four sections a place is generally marked out at a distance of four steps along the principal diagonal counted from the outer angle. Each spot is therefore equally distant from the two external sides of the section. These four points (fig. 173) are called *kan*, *sun*, *kw'an*, and *k'in*. The latter terms are the names given to the diagrams in the magic symbol of the universe, called the *Pát kwá*, or "Eight Diagrams," which stand for the directions Northeast, Southeast, Southwest, and Northwest. Like the *Nyout* circuit, this game board has a cosmical significance and represents the world. As if to more fully embody and express the relation supposed to exist between the seasons, the world quarters—all things in the universe even to the tones of the voice that distinguish the meaning of words—as well as the notes of the musical scale, two copper wires are strung within the resonant chamber of the Korean board and emit a musical note when a piece is played. In accordance with the theory I have advanced as to the origin of games played upon boards without the intervention of dice, we may expect to find intimations of their use in earlier stages of this game. Such an earlier stage may be represented in the Malayan game of *Chuki* (No. 55).

55. CHUKI. Board.[1] Johore, Malay Peninsula. (Fig. 174.)

Chuki is a game played upon a board (*papan chuki*) in the form of a small table, marked with squares, ten on a side. The four squares in

[1] Cat. No. 16622, Mus. Arch., Univ. Penn. From the collection of His Highness the late Sultan of Johore at the Columbian Exposition.

The writer is indebted to the Hon. Dato Meldrum, of Johore, Straits Settlements, for the rules of the game and a drawing of the board as set for a game reproduced in fig. 175. Mr. Charles P. G. Scott has courteously furnished the writer with the following references to the game in Malay and Javanese dictionaries.

Malay *chūki:*

"*Chuke,* name of a game resembling draughts; v. *Juki. Juki,* name of a game resembling draughts; v. *Chuke.*" 1852, Crawford, Malay and Eng. Dict., pp. 39, 62.

"*Xūki* [= *chuki*], *sorte de jeu d'échecs. Pāpan xūki amàs būah ña permāta, un échiquier en or dont les pièces étaient faites de pierres précieuses* (*S*[*ejārat*] *Mal*[*āyu*] [= *Chroniques malaises,* imprimées à Sincapour] 109)." 1875, Favre, Dict. malais-français, 1:491.

"*Tjæki* [= *chūki*], *soort van verkeerspel, met 2 dobbelsteenen en 52 steentjes van twee verschillende kleuren aan weerskanten, die meest van chineesch porcelein zijn* [i. e. a sort of backgammon, with two dice and fifty-two pieces of two different colors on opposite sides, which are usually of Chinese porcelain]." 1880, Von de Wall and Van der Tuuk, Maleisch-Nederlandsch woordenboek, 2:46.

"*Tjoeki, damspel; papan tjoeki, dambord.*" 1893, Klinkert, Nieuw Maleisch-Nederlandsch woordenboek, p. 277.

Javanese *chuki:*

"*Tjoeki* [= *chuki*], *soort van damspel, met honderd twintig ruiten, zestig zwarte en zestig witte stukken* [i. e. a kind of checkers, with one hundred and twenty small squares, sixty black and sixty white pieces]." 1835, Roorda van Eysinga, Algemeen Javaansch en Nederduitsch woordenboek, p. 622.

"*Chuki, N*[*goko*] *K*[*rama*] [i. e. langage vulgaire et langage cérémoniel] (*une sorte de jeu de dames*)." 1875, Favre, Dict. jav.-français, p. 87.

Mr. Scott says: "I have not searched for the word outside of the Malayan languages. If I were to express an opinion on the scanty records before me, I should

the center of the board are in part occupied with a small raised square (*tĕmpat mangkok*, "place of bowl"), leaving one hundred and twenty points of intersection exposed, on which sixty white and sixty black men (*batu*, "stones") are arranged. Two persons play alternately, letting three dice fall in a bowl, which is set on the raised square in the middle, and taking off the board the pieces of the thrower, according to the casts.[1]

Fig. 176.
GO PLAYERS (PRIEST AND WRESTLER).
Japan.
After native drawing by Boku-sen, reproduced in Korean Games.

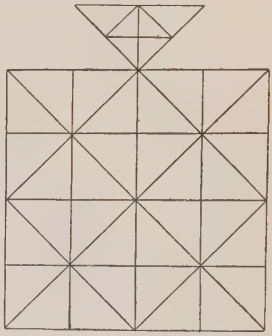

Fig. 177.
JUROKU MUSASHI.
10 by 14 inches.
Japan.
Cat. No. 7090, Museum of Archæology, University of Pennsylvania.

The Japanese play a similar game upon the *Go* board, covering the squares, and taking off the pieces, but without the use of dice.

56. Go. Japan. Board and men.[2]

The game of *Go* is regarded by the Japanese as having been intro-

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say that the word and the thing are of foreign origin, very likely Chinese or Cochin-Chinese." In a subsequent communication, after comparison with the Chinese *k'i*, a generic name for games played with pieces or men, *tséung k'i*, "chess," and the Cantonese *chuk k'i*, "to play chess," he concludes that these resemblances indicate that the Malay and Javanese *chuki*, which is almost certainly of extraneous origin, is ultimately from the Chinese.

And later he sends the following entry in which the word is associated with a Chinese form in the Amoy dialect.

"*Tjuki*, 'a kind of draughts played with white and black beans' (Pijnappel, Op. cit. [Maleisch-Hollandsch woordenboek 2e druk] I, 116); probably = Chinese *tioh kî* 'to play at draughts or chess' (Douglas, Op. cit. [Dict. of the Amoy vernacular] p. 210. Compare *Tjĕki*." 1890, G. SCHLEGEL, Chinese loanwords in the Malay language, p. 14 (Extrait du, · · · T'oung pao, Archives pour servir à l'étue de l'histoire, des langues, de la géographie et de l'ethnographie de l'Asie orientale).

"*Tjĕki* 'a kind of Chinese hazard game' (Pijnappel, Op. cit., I, 112)? Comp. *Tjuki*." 1890, G. SCHLEGEL, Op. cit., p. 13.

[1] It will be observed that in this game the number of points are (60 by 2) + 1 = one hundred and twenty-one, while on the *Pa-tok* board there are (60 by 6) + 1 = three hundred and sixty-one squares.

[2] Cat. Nos. 93220, 93221, U.S.N.M. Deposited by the Corcoran Art Gallery, Washington.

duced into that country from China. The exact date is not known, but it is usually attributed to the eighth century A. D. It is a great favorite at the present day in Japan, especially among military men, being regarded as furnishing instruction in the art of war.[1]

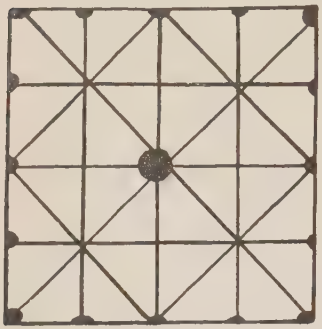


Fig. 178.
JUROKU MUSASHI.
Japan.
From the Wa kan san sai dzu e, reproduced in Korean Games.

57. JUROKU MUSASHI. "Sixteen Soldiers." The Japanese Game of Fox and Geese. Japan.
(*a*) Board and men.[2]
(*b*) Japanese picture of players.[3]

The board has 8 by 8 squares, each of which is divided into two parts by a diagonal line (fig. 177). In the games now current in Japan there is a triangle at the top of the board two squares wide, with its apex resting upon the middle of the upper side. Sixteen men (*musashi*, "soldiers") are arranged at the sixteen points of intersection at the sides of the square with the *Taisho*, or General, in the center. Two play, the "General" striving to capture the "Soldiers," and the latter to block him.

The board and men appear to be an expression of the same cosmical ideas as are found in the game of *Nyout*, there being four men associated with each side of the square. The traditions of the game still more closely identify it with the Korean *Nyout*.

A Chinese form of the game is figured and described by Dr. Karl Himly[4] under the name of *Shap luk kon tséung kwan*, or "The Sixteen Pursue the Commander" (fig. 179).

The board, he says, is seen in the streets, where the players—laborers,

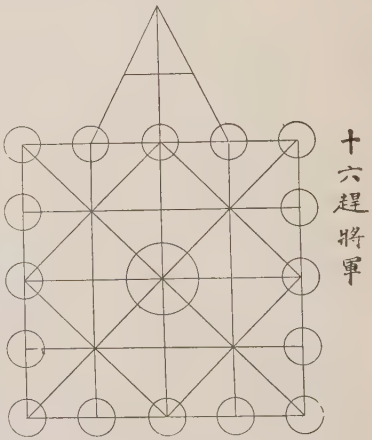
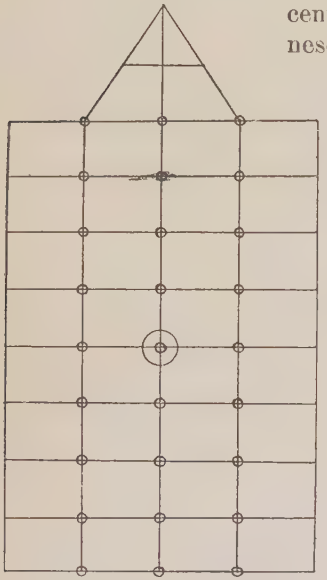


Fig. 179.
SHAP LUK KON TSÉUNG KWAN.
China.
After Himly.

[1] O. Korscheld, Das Go-Spiel, Mittheilungen d. deutschen Gesellschaft für Natur. und Völkerkunde Ostasiens, III, pp. 21–24.
[2] Cat. No. 7090, Mus. Arch., Univ. Penn.
[3] Cat. No. 17832, Mus. Arch., Univ. Penn.
[4] Anmerk. in Beziehung auf das Schach- u. andere Brettspiele, Zeitschrift d. deutschen morgenländischen Gesellschaft, XLI, p. 469.

children, etc.—scratch it on the ground and use potsherds, etc., for pieces. The triangle bears the somewhat irreverent name of *mau ts'z* (privy).

A variant of this game is figured by Hyde[1] (fig. 180), played upon a board with 5 by 9 rows, with twenty-eight pieces, one of which, the *tséung kwan*, or "Commander," is placed in the center. The name he has transcribed in Chinese characters as *yeung luk sz' kon tséung kwan.*



楊六四趕將軍

Fig. 180.
LUDUS DE SUBJUGANDI REBELLES.
China.
After Hyde.

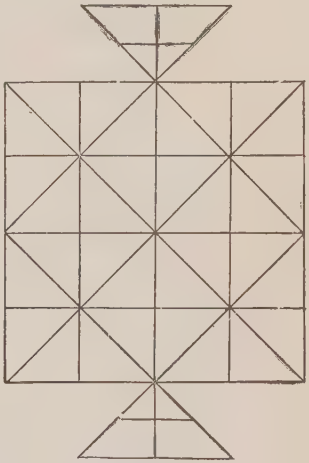


Fig. 181.
TIGER GAME.
Board, 12 by 20 inches.
Johore, Straits Settlements.
Cat. No. 16385, Museum of Archæology, University of Pennsylvania.

58. DAM HARIMAN. Board for "Tiger Game,"[2] the Malayan Game of Fox and Geese.

Unpainted board, 12 by 20 inches, inscribed with diagram (fig. 181). The lines are incised in the wood and the board raised by two strips of wood nailed transversely across the bottom.

Identical with the Hindu game, described by Herklots,[3] under the name of *Mogol Putt'hān*[4] (Mogul Pathan), that is, Mogul against Pathan.

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[1] De ludo subjugandi rebelles, De Ludis Orientalibus, p. 215.

[2] Cat. No. 16385, Mus. Arch., Univ. Penn. From the collection of His Highness the late Sultan of Johore at the Columbian Exposition.

[3] Qanoon-e-islam, Appendix, LIII.

[4] Another common Hindu game, said to be known throughout India, is called *Pulijudam* or "tiger game." Three "tigers" are placed on the board (fig. 182) at the points indicated by black spots. The other player has fifteen "lambs," which he lays down at the points of intersection, one by one, alternating with the move of a tiger. The tigers endeavor to jump over and kill the lambs, and the latter to pen in the tigers.

In Peru a similar game is played on a board (fig. 183) under the name of *Solitario*. In Mexico a corresponding game (fig. 184) is called *Coyote*.[1]

In Siam we find the game of *Sua ghin gnua*, or "Tiger and Oxen" (fig. 185), and in Burma, *Lay gwet kyah*.

There are three big tigers and eleven or sometimes twelve little ones. The object is for the big tigers to hunt down on a draft board and eat the little ones. If, however, the cubs can corner the big ones and prevent them from taking a leap, the latter have to succumb.[2]

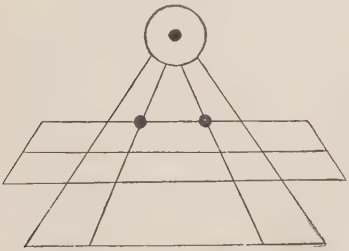

Fig. 182.
TIGER GAME (*Pulijudam*).
India.

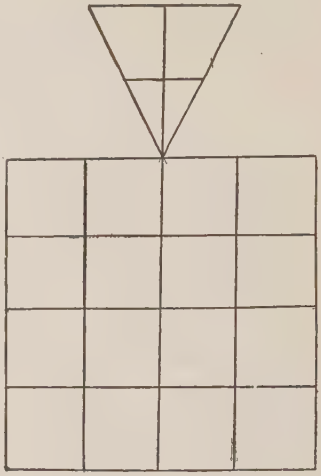

Fig. 183.
SOLITARIO.
Peru.

The Samoan men at the Columbian Exposition at Chicago described a native game to the writer under the name of *Moo*. It was played with pebbles upon the squares of a mat by two persons. One had a

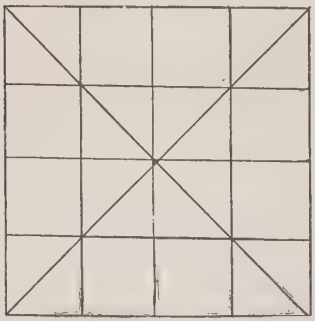

Fig. 184.
COYOTE.
Mexico.

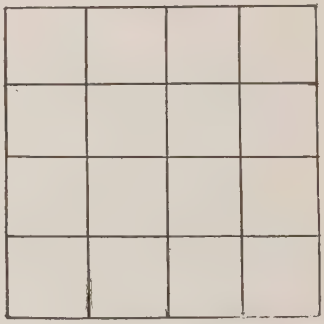

Fig. 185.
SUA GHIN GNUA.
Siam.

number of white stones, the other a black piece. The rules appeared to be the same as Fox and Geese. In Hawaii, Mr. James Jackson

[1] A modern printed sheet for the Juego del Coyote from Mexico in the University Museum (Cat. No. 16384) bears a diagram identical with the game of Fox and Geese (fig. 186). The rules given are the same.

[2] The Burman, II, p. 83.

Jarves speaks of Konane, "an intricate game of draughts played with colored stones upon a flat stone ruled with a large number of squares."[1]

In Madagascar, Sibree[2] describes a game resembling draughts as a very common pastime. It is played with pebbles or beans on a board or piece of smooth stone or earth having thirty-two divisions or holes, much in the same way as the game of Fox and Geese.

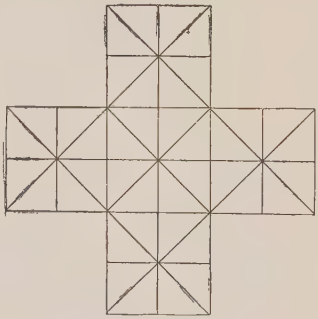

Fig. 186.
FOX AND GEESE.
United States.

59. FOX AND GEESE. United States, 1876. Paper diagram.[3] (Fig. 186.)

60. A-WI-THLAK-NA-KWE. "Stone Warriors." Zuñi Indians. New Mexico. Diagram of board and set of men.[4]

Played by two or four persons upon a square board divided into one hundred and forty-four squares, each intersected by diagonal lines. At

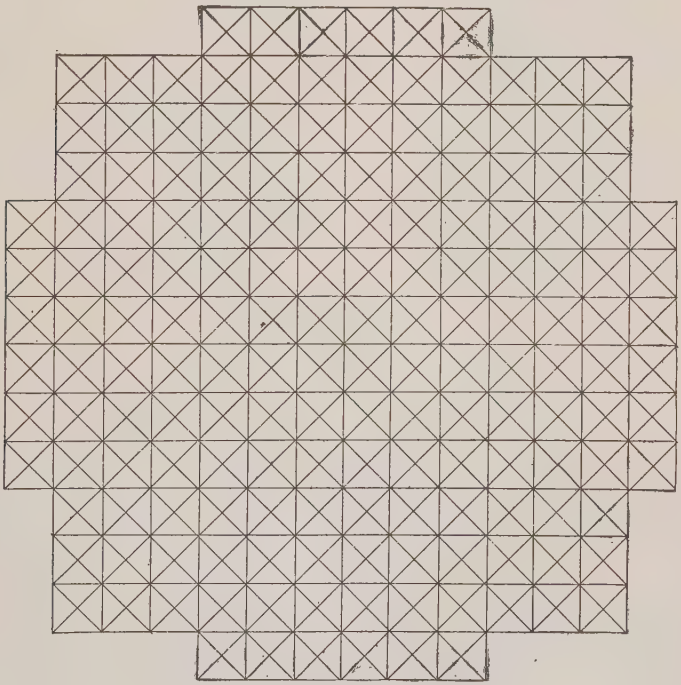

Fig. 187.
GAME OF STONE WARRIORS.
Zuñi Indians, New Mexico.
Drawing furnished by Mr. Frank Hamilton Cushing

[1] H. Carrington Bolton, Some Hawaiian Pastimes, Jour. Am. Folk-lore, IV, p. 22.

[2] James Sibree, jr., Madagascar and Its People, p. 352.

[3] Cat. No. 17577, Mus. Arch., Univ. Penn.

[4] Cat. No. 16550, Mus. Arch., Univ. Penn. Reproductions made by Mr. F. H. Cushing, who furnished the account of the game.

the opening of the game each player places six men in the center of the six squares at his side of the board. The latter usually consists of a slab of stone pecked with the diagram (fig. 187). The men consist of disks of pottery about 1 inch in diameter, made from broken vessels, those upon one side being distinguished by being perforated with a small hole, while those of the other side are plain. The object of the game is to cross over and take the opponent's place, capturing as many men as possible by the way. The moves are made one square at a time along the diagonal lines, the pieces being placed at the points of intersection. When a player gets one of his opponent's pieces between two of his own it may be taken, and the first piece thus captured may be replaced by a seventh man, called the "Priest of the Bow," which

Fig. 188.

POTTERY DISKS USED AS MEN IN GAMES.

Diameters, 1¼, 1, and 1⅜ inches.

Cliff dwellings, Mancos Canyon, Colorado.

Cat. Nos. 23556–23559, Museum of Archæology, University of Pennsylvania.

may move both on the diagonal lines and on those at right angles. A piece may not be moved backward. When four persons play, those on the North and West play against those on the South and East.

VOCABULARY.

The board, *Á te a lan e*, "stone plain."
The straight lines, *a kwi we*, "*Canyons*," or "*arroyas*."
The diagonal lines, *Ó na we*, "trails."
The ordinary men, *A wì thlak na kwe*.
The seventh piece, *Pi-thlan shi-wani* (*Mósóná*), "Priest of the Bow."

The latter piece by power of magic is enabled to cross the canyons. The game is commonly played upon housetops, which are often found marked with the diagram. The game, or something similar to it, was widely distributed among the Pueblo Indians of the Southwest, as is shown by the numerous pottery disks, which were used for it

found among the ruins. Its antiquity is attested by the presence of such disks among the remains in the cliff houses. Four such disks from Mancos Canyon, in the University Museum, are shown in fig. 188.[1]

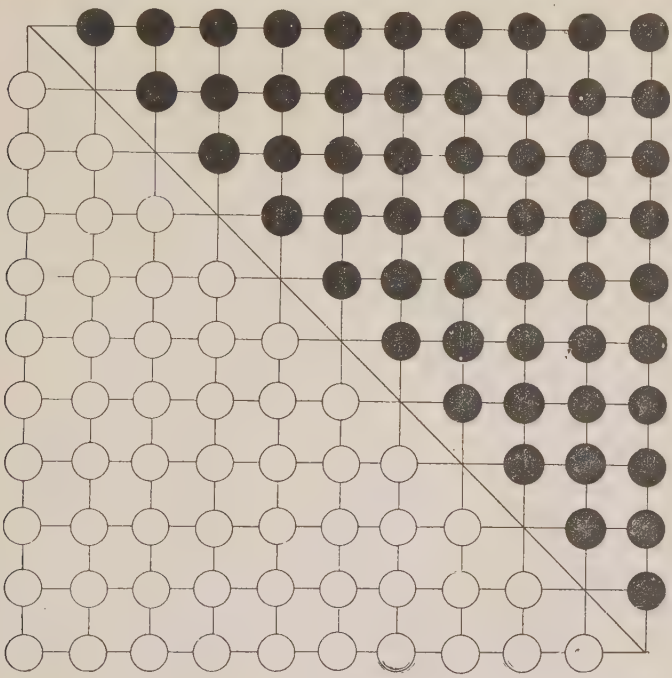

Fig. 189.

THE GAME OF TO-TO-LÓS-PI.

Moki Indians, New Mexico.

After an unpublished drawing by Dr. J. Walter Fewkes.

Dr. J. Walter Fewkes[2] has described a somewhat similar game as existing among the Moki Indians of New Mexico under the name of *To-to-lós-pi*. It can be played by two or more parties. A rectangular

[1]Disks roughly shaped from fragments of earthenware vessels were found by Mr. Clarence B. Moore in mounds of the Georgia Coast (Jour. Academy of Natural Sciences, Phila., XI), of which specimens contributed by him are contained in the Museum of Archæology of the University of Pennsylvania (Cat. Nos. 20160–20162). They vary from 1½ to 2 inches in diameter. Similar pottery disks, some perforated, are found in many localities in the United States. Mr. G. E. Laidlaw writes that large numbers of disks of stone and pottery are found in the ash beds of ancient village sites in Ontario, Canada, east and northeast of Lake Simcoe. They are seldom bored, and the pottery disks, which range from 1 inch to 2 inches in diameter, are made from shards, and have the original curve of the pot. They bear no markings, and in a great majority of cases the edges are not ground smooth. He suggests their probable use in games. Pottery disks, all made from shards, some with central perforations, are found in Peru, Bolivia, and Argentina, and doubtless other South American sites.

[2]Journal of American Ethnology and Archæology, II, p. 159.

figure (fig. 189), divided into a large number of squares, is drawn upon the rock, either by scratching or by using a different colored stone as a crayon. A diagonal line, *tûh-kí-o-ta*, is drawn across the rectangle from northwest to southeast and the players station themselves at each end of this line. When two parties play, a single person acts as player and the other members of the party act as advisers. The first play is won by tossing a leaf or corn husk with one side blackened. The pieces which are used are bean or corn kernels, stones and wood, or small fragments of any substance of marked color. The players were stationed at each end of the diagonal line, *tûh-kí-o-ta*. They move their pieces upon this line, but never across it. (On this line the game is fought.) The moves which are made are intricate, and the player may move one or more pieces successively. Certain positions entitle him to this privilege. He may capture, or, as he terms it, kill one or more of his opponents at one play. In this respect the game is not unlike checkers, and to capture the pieces of the opponent seems to be the main object of the game. The checkers, however, must be concentrated and always moved toward the southeast corner.[1]

This game is now rarely played on the East Mesa, but is still used at Oraibi. It is said to have been played in ancient times by the sun and moon or by other mythical personages. Figures of this game formerly existed on the rocks near the village of Walpi, and may be the same referred to by Bourke.

Games resembling the above seem to have existed widely among the American tribes. Mrs. W. W. Brown[2] gives the following account of a game of the Wabanaki Indians:

> *Ko-ko-nag'n* has a resemblance to the game of Checkers, but, although nearly all are more or less proficient at the latter game, there are only a few who understand *ko-ko-nag'n*. This, unlike any other game, may be played by male and female opponents. It is the least noisy, the skillful play requiring deliberation and undivided attention. A smooth surface is marked off into different-sized spaces, and pieces of wood, round and square, marked to qualify value, are generally used, though sometimes carved bone is substituted.

This may be the game referred to by Rasle among the Norridgewok Indians, where he says: "*Un autre jeu où l'on place des grains sur des espèce de lozanges entrelassées* (*dicitur*) *mañmadöañgañ*."

[1] It would appear from Dr. Fewkes's sketch of the board that only one player moved toward the southeast and that his opponent went in the opposite direction.

[2] Some Indoor and Outdoor Games of the Wabanaki Indians, Trans. Roy. Soc. Canada, sec. II, 1888, p. 41.

The other principal class of arrow-derived games is that in which a number of staves, splints, or other substituted objects are shaken or divided at random, originally to determine *place* directly, or to discover the *number* and thence the *place*. Like the preceding class, it is widely distributed throughout the world. The divinatory associations of these games are more clearly manifest to the writer than those in which the tossed staves or their substitutes are used, and the derivation of the implements from arrows more easily demonstrable.

An examination of the arrows used by savage people shows that the custom of marking them in such manner that each individual might distinguish his own was very general. From this, both in the Old and the New World, the arrow came to stand as the token and symbol of a man,[1] and as such, among many other symbolic uses, was employed in divinatory games. It appears that the marks of the arrows of the American Indians, which are placed upon the shaftments, refer not, it would seem, to the personal names of their owners, but to their owners' place in the system of classification according to the directions in the circuit of the clans. At a later period of development we find these cosmical marks replaced by the written name of the owner, as in Eastern Asia. Traces still survive, even here, as on the practice arrows of Korea (No. 78) of the earlier system.

The method of marking in America is by means of colored bands (ribbons) painted upon the shaftments. It may be assumed that a quiver made up of the different arrows of the individuals of a tribe would represent the Four Quarters and the intermediary points. It is such perfect quivers and their conventionalized representatives that constitute the implements of magic employed in the games which follow. In connection with these there are exhibited several series of arrows, together with a variety of objects regarded by the writer as having been derived from the employment of arrows as symbols of personality.

61. Tong-Kai. Korea.

(*a*) Quiver of Ceremonial Arrows.[2] Worn as an emblem of rank by Korean officials in military court-dress.

[1] The symbolism of the arrow was discussed by Mr. Cushing in his vice-presidential address before Section H of the American Association for the Advancement of Science, Springfield, 1895. According to him, "owner's marks, on arrows, were not designed primarily as signs of mere possession. They were indicative, rather, of the place in the cosmically arranged circuit of the tribe, of the man who made and possessed the arrows. It is probable that such marks were at first placed on arrows to serve as protective and directive potencies. By imparting somewhat of the man's personality to the arrows, their special aid to him was insured and at the same time their flight was endowed with the breath or wind of the quarter to which he and they alike belonged. It naturally followed that, much as his face was recognizable as belonging to him, so were these arrows recognizable as essentially of his place and of him—so much so, that ceremonially they often stood for the man himself even more intimately than do our signatures stand for us." But the second part of this highly important paper, in which this was embodied, remains unpublished.

[2] Cat. No. 151147, U.S.N.M. Collected by Hon. W. W. Rockhill.

(*b*) Reproduction of native picture of Korean officials in military court-dress wearing quiver with arrows.[1]

The quiver exhibited has ten arrows, while in the native picture five arrows are represented as being worn. These are regarded by the writer as corresponding with the Five Directions, and as symbols of regnal or universal authority.[2] They are worn by the King himself, as well as officers who receive orders from him. The actual arrows are 26 inches in length, made of lacquered bamboo with white feathering and no points. The quiver is of Japanese leather ornamented with silver disks and sewed along the edges with colored silk.[3]

Chinese generals wear (or wore) a set of six arrows as an insignia of rank. A set of such arrows (Cat. No. 17686) in the Museum of the University, picked up in August, 1894, on the field of A-San in Korea, three days after the battle, by Dr. E. B. Landis, are six in number (fig. 190). The shafts are of white wood, 37 inches in length, feathered with two

Fig. 190.

CEREMONIAL ARROW.

Insignia of Chinese general.

One of set of six, inscribed with names of twelve "branches."

Length, 42 inches.

Cat. No. 17686, Museum of Archæology, University of Pennsylvania.

feathers and painted with a red ribbon on the shaftment and at the nock. The points are of iron, leaf-shaped and painted black, and are fastened in the shaftment with a wrapping of cherry-bark. They are painted in red with the twelve characters which stand as names for the Twelve Branches or Duodenary Cycle.[4] These signs are used to

[1] Korean Games.

[2] The flag of a Chinese general in the University Museum (Cat. No. 16843) consists of five vertical stripes, of green, yellow, black, white, and red, the colors of the East, Middle, North, West, and South.

[3] Walter Hough, Korean Collections in the National Museum, Report U. S. Nat. Mus., 1891, p. 481.

[4] Used in connection with the Ten Stems to form a cycle of sixty combinations employed by the Chinese from remote antiquity for the purpose of designating successive days, and, since the Han dynasty, applied to the numbering of years. Twelve animals: Rat, Ox, Tiger, Hare, Dragon, Serpent, Horse, Goat, Monkey, Cock, Dog, and Pig are associated with the Twelve Branches, and are believed to exercise an

indicate the twelve points of the Chinese compass, *tsz'* corresponding to the North, *máu* to the East, *ng'* to the South, and *yau* to the West. From this peculiarity it is not improbable that these arrows were originally intended for divinatory purposes.

62. P'ÁI TS'ÍM. "Notice Tally."[1] (Fig. 191.) Chinese in the United States.

Tally used to assemble members of the Chinese gamblers and shopkeepers' guild in Philadelphia. In common use for similar purposes in China, where bamboo instead of varnished wood is used. This tally bears on one side the name of the gamblers' guild, and on the other the name of one of its members, with a blank for the insertion of the hour of the meeting, as occasion requires. The tallies are kept by a member of the guild, who summons the members by sending each his tally. This constitutes the credentials of the person bringing it to the meeting.

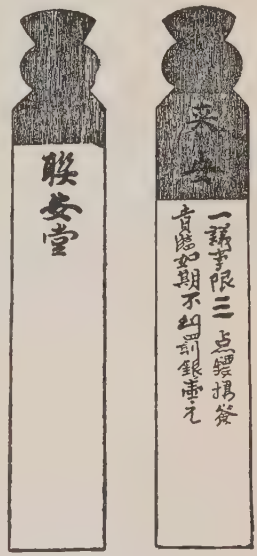

Fig. 191.
NOTICE TALLY (*P'ái ts'ím*).
Length, 8½ inches.
Chinese in United States.
From Korean Games. Cat. No. 15815, Museum of Archæology, University of Pennsylvania.

These tallies are direct descendants of the arrows used in more primitive conditions for the same purpose Their name, *ts'ím*, is almost identical with the Chinese name for arrow, and their form still retains a suggestion of their origin. Compare with the tallies used in the game of *Chong ün ch'au* (No. 27).

63. NÍN KÁN. New Year Cards. Chinese in the United States and China.

Rectangular strips of red paper, 4½ by 9 inches, twice folded, and bearing personal names and names of shop companies. Widely exchanged at the New Year season, when they are unfolded and pasted in a row in the shop or dwelling, where they are kept during the year.

These cards may be regarded as belonging to the same family as the message tally, or arrow, with the name of a man. Like it they ceremonially stand for the individual whose name they bear, and as such are preserved as pledges and tokens, given each other by members of the same clan and their friends, for the year. The name *kán* means primarily a slip of bamboo "formerly used for making notes on."

Comparable with the "year cards" are the *ho-hpai* (Chinese, *hò p'ái*) or "name tablets," which all the male inhabitants of Korea are required by law to carry.

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influence, according to the attributes ascribed to each, over the hour, day, or year to which, through the duodenary cycle of symbols they respectively, appertain. The usage is admittedly of foreign origin and is traced to intercourse with Tartar nations. Mayer's Chinese Readers' Manual, Pt. 2, pp. 296, 302.

[1] Cat. No. 15815, Mus. Arch., Univ. Penn.

When a free-born Korean boy reaches the age of 15, he has a small wooden label cut, which he carries with him. This label is made of pear wood or mahogany, and is about 2 inches in length by ½ inch broad. It is inscribed in Chinese characters. Across the top is the name of the *Pou* (Chinese *pù*) or ward to which the boy belongs. Then in a line below the designation *han-ryang*, "leisure fellow," that is, not in government service, and the boy's name with the date of his birth. The date on which the label is made is cut on the reverse. This label must be sealed by an official of the treasury, who brands it with a hot iron and registers the boy's name and other particulars. When a boy enters the *Tjin-sŭ* (Chinese, *tsun sz'*), he has another tablet cut, this time of boxwood, with his proper title instead of *han-ryang*. Upon passing the military or civil examinations, the label is cut from black horn, and upon obtaining the first grade an ivory label is permitted. Since writing the above account, which was dictated by Mr. Pak Young Kiu, Korean Charge d'Affaires at Washington, I have received from Dr. E. B. Landis, at Chemulpo, two specimens of *ho-hpai*

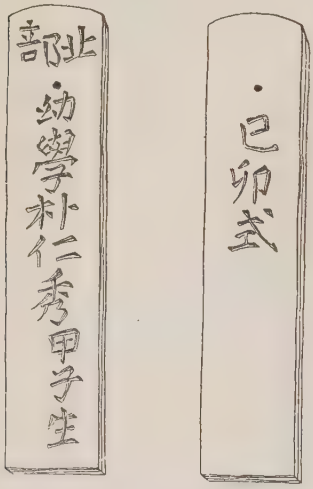


Fig. 192.

NAME TABLET (*Ho-hpai*).

Length, 3⅜ inches.

Korea.

Cat. No. 19845, Museum of Archæology, University of Pennsylvania.

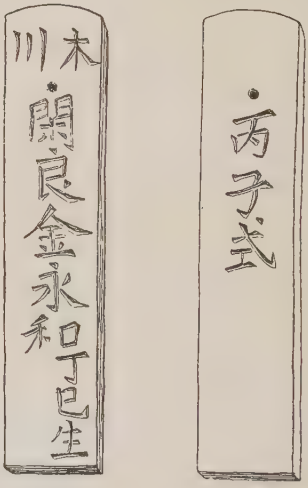


Fig. 193.

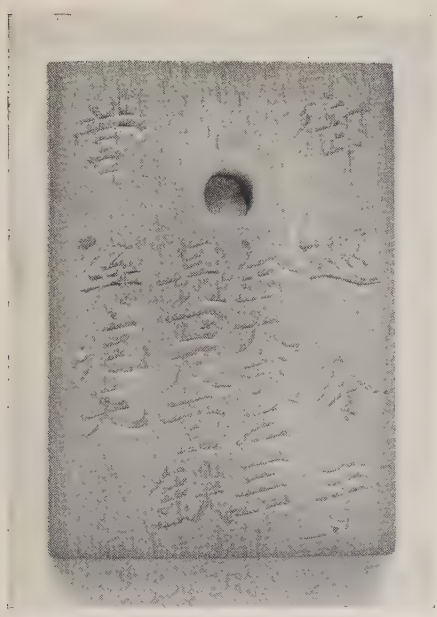
NAME TABLET (*Ho-hpai*).

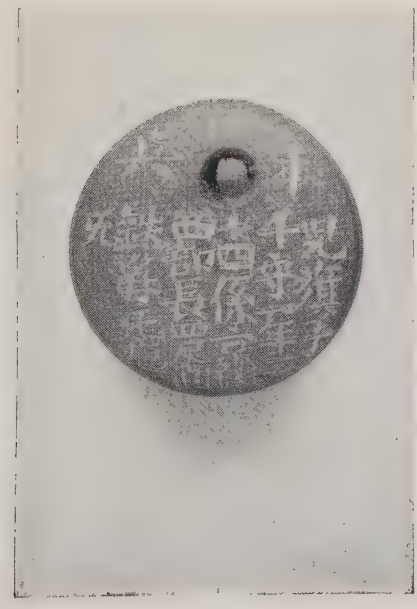
Length, 3⅜ inches.

Korea.

Cat. No. 19846, Museum of Archæology, University of Pennsylvania.

(figs. 192, 193), concerning which he gave the following particulars: "I have simply had reproductions made, as they are not in use since the war. They are, however, exact reproductions, with the exception of the magistrate's seal, which was always burnt on the back. At the top, reading from right to left, are the words *Yon Hak* and *Han Ryang*. These refer to the class of society to which he belongs. The first is "Patrician" and the second "Plebeian." After this follows the name and surname and in the lower corner the year of birth. On the back is the year when the *ho-hpai* expires. It is renewed every three years. There is another kind called *yo-hpai* (Plate 33), which was used by the servants of the various officials as proof of identity when drawing their monthly wages, which was always paid in kind." *Yo-hpai* (Chinese, *iú p'ái*) is defined in the *Dictionaire Coréen Français* as "plaque des soldats sur lequelle leur nom est écrit." The secret agents of the king in Korea, called *E-sa* (Chinese, *ü sz'*), used a plate of silver engraved with a horse as an emblem of their royal authority.





IDENTIFICATION TABLETS (*Yo-hpai*).

Korea.

Cat. Nos. 20099, 20098, Museum of Archæology, University of Pennsylvania.

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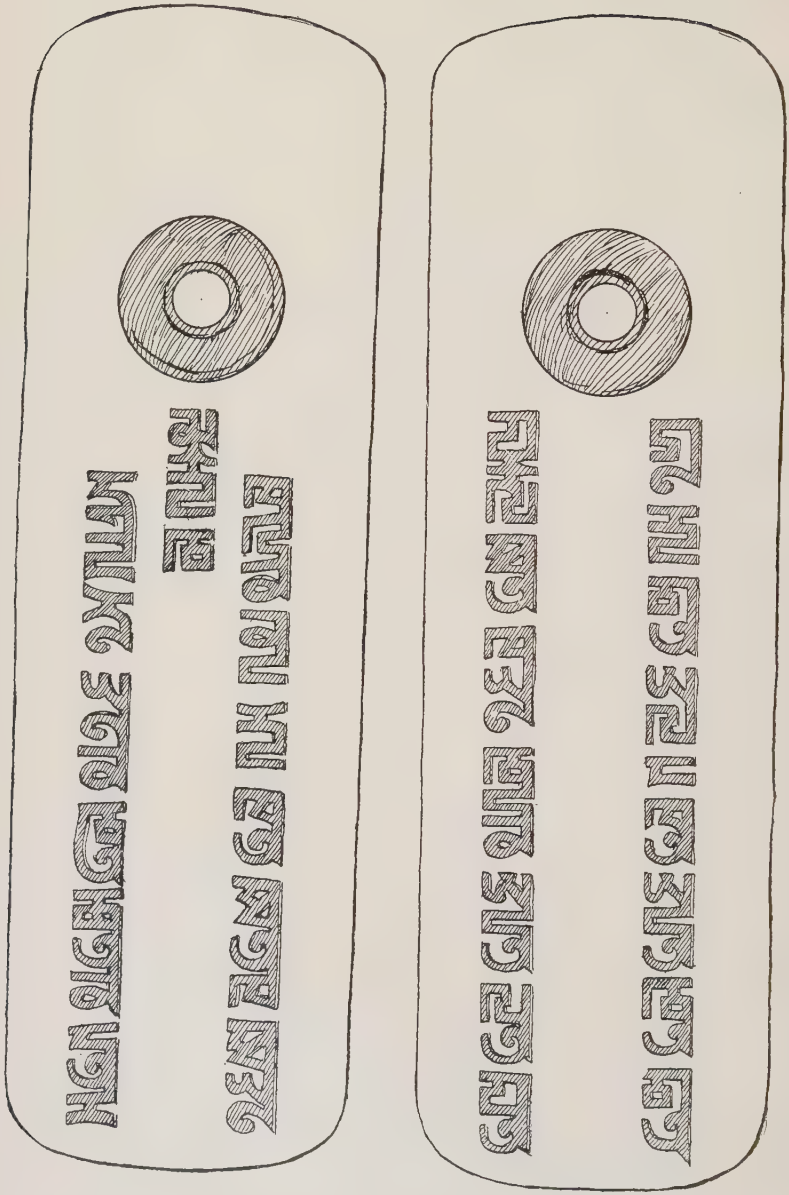


PÁÏZAH OF THE MONGOLS.

Length, 6 inches.

From a specimen found in East Siberia.

From the Book of Ser Marco Polo, by Col. Henry Yule, C. B.

BAMBOO MONEY.
U. S. National Museum. Glover collection.

OBVERSE OF JADE AUDIENCE RING.
Diameter, 4¼ inches.
Ancient China.
Cat. No. 130662, U.S.N.M.

Analogous to these Korean objects are the tablets of authority carried by the Mongol princes, which are described by Marco Polo (Plate 34). These were of silver, silver gilt, and of gold, and were inscribed with a legend commanding respect in the name of the Kaan. To this was added the figure of a lion, and below the sun and moon, while the highest lords received a tablet with gerfalcons. I have been led to refer to these *Páizah*, which are so fully described and illustrated by Colonel Yule (Marco Polo, Book II, C. VII, Note 2), through their suggesting in connection with other objects a theory of the origin of the so-called "cash" or current money of China (fig. 194). These coins, which uniformly bear the name of the regnal period, by which the sovereign is known to the world, may be regarded as having been, like the *Páizah*, emblems of authority emanating from the sovereign. Specimens of Chinese bamboo money (Plate 35), similar in appearance to the Korean *ho-hpai*, occur in the Glover collection in the United States National Museum.

Fig. 194.
OBVERSE OF CHINESE COIN (*Ts'ín*).
China.

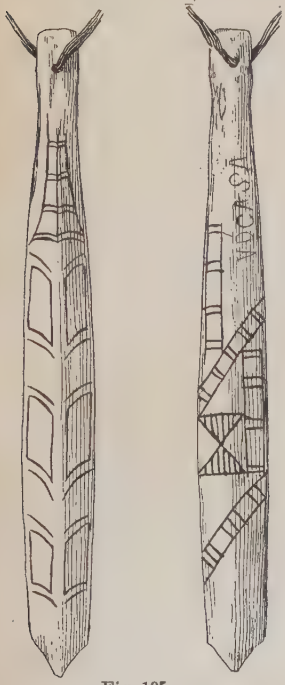


Fig. 195.
TLINGIT TABLET.
Length, 6¾ inches.
Alaska.
Cat. No. 168372*a*, U.S.N.M.

In ancient China, according to the Book of History (Shu King, Sec. II), the nobles are described as having five kinds of scepters made of precious stones. Of these, the two lowest classes were round with a hole in the center and about 5 inches in diameter. A specimen in the United States National Museum (Cat. No. 130662, gift of Chang Yen Hoon, His Imperial Chinese Majesty's envoy extraordinary and minister plenipotentiary) (Plate 36) is made of jade, and is of the kind designated as *kuk pik*, or "grain-besprinkled slab."

We have in these scepters an ancient emblem of authority corresponding in form to the coin. When we examine the name of the latter, we find it to be *ts'ín*, a word differing but slightly from *tsín*, "arrow," from which I regard both the coin and tablet as having in all probability been derived. The character for *ts'ín* is written with the radical for "spear" doubled, with the radical for "metal" on the left. It differs in the substitution of metal for *p'ín*, a "leaf" or "slip," from the character *tsín* used in writing the name of the Korean playing cards, *htou-tjyen* (Chinese, *tau tsín*) (No. 77).

Analogous to the Korean *ho-hpai* are the amulet bags (*mamori bukuro*, protection bag), which Japanese children used to wear outside their dresses with a ticket containing their names and residences attached. "At a later period they are concealed; but all classes wear them during their natural lifetime. Some of them contain Sanskrit characters, others pictures or names of Shinto divinities or Buddhist saints, while all contain the navel cord of the wearer with the date of his birth inscribed."[1]

The Tlingit make and carry small flat bone and ivory tablets. A number collected by Lieut. George T. Emmons, U. S. N., in the United States National Museum (Cat. No. 168372) are represented in figs. 195–200.

[1] Glimpses of Dreamland, translated by Ludovic Mordwin; The Chrysanthemum, II, No. 2, Note, p. 50.

The designs are incised and filled in with red paint. These the writer is disposed to class with the Korean *ho-hpai* as personal emblems. One of them (fig. 195) is in the

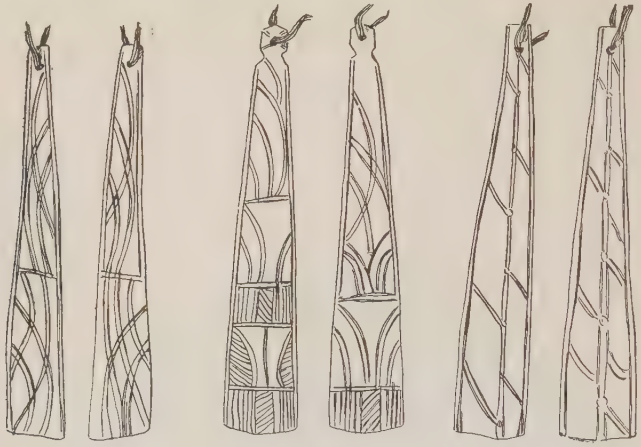


Fig. 196.

TLINGIT TABLETS.

Length, $4\frac{1}{4}$ to $4\frac{3}{8}$ inches.

Alaska.

Cat. No. 168372*b*, *c*, *d*, U.S.N.M.

form and is marked like the feathered shaftment of an arrow. It bears at the upper end on one side the word VOCASA inscribed in Roman letters. Another somewhat

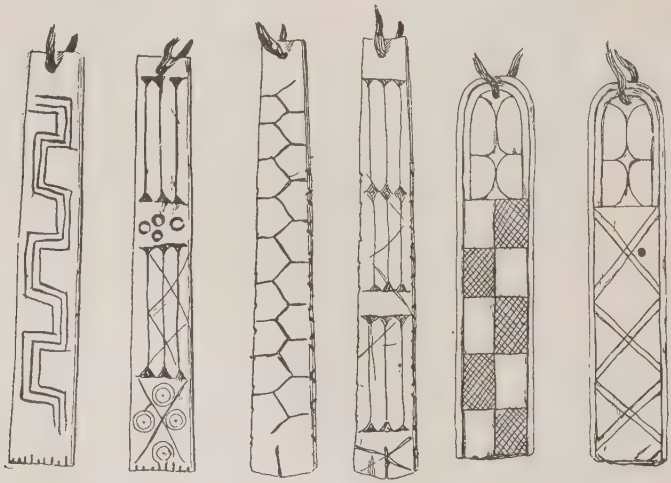


Fig. 197.

TLINGIT TABLETS.

Length, 4 to $4\frac{5}{8}$ inches.

Alaska.

Cat. No. 168372*e*, *f*, *g*, U.S.N.M.

similar tablet in the University Museum (Cat. No. 15319) is represented in fig. 201. It is not impossible that this string of bones collected by Lieutenant Emmons and

stated by him to be part of the paraphernalia of a Shaman are analogous to string of leg bones of the Arctic fox, which Mr. Bryant found in use among the Arctic Highlanders. (See p. 719.)

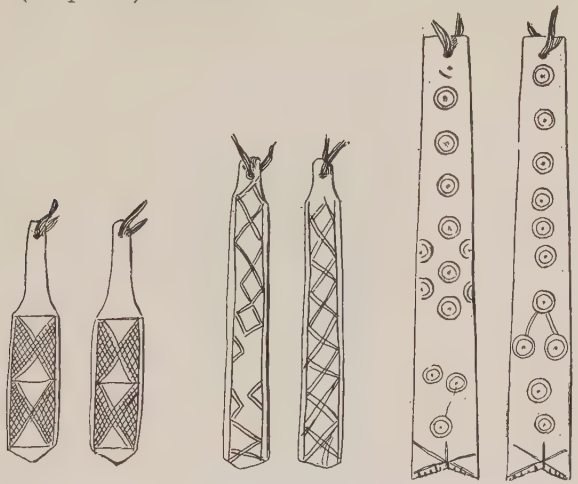


Fig. 198.
TLINGIT TABLETS.
Lengths, 2½, 3¼, and 4⅜ inches.
Cat. No. 168372*h*, *i*, *k*, U.S.N.M.

64. TANZAKU. A narrow strip of thick cardboard, 2⅜ by 14½ inches, used for writing verses on. Japan.

The usual size of the *tanzaku* is about 2½ by 14¼ inches. They are frequently made of a thin strip of wood. The name is a Japanese transcription of the Chinese *tiin ch'ak* "a short list or memoranda,"[1] and the object itself may be regarded as a survival from the time when books were engraved on similar strips of bamboo, like existing Buddhist scriptures in Siam. The temple lots, *mikuji* (No. 68), and the Korean cards (No. 77) correspond with a bundle of *tanzaku*, which are still represented on and give name to certain card-pieces in the Japanese pack (No. 81).

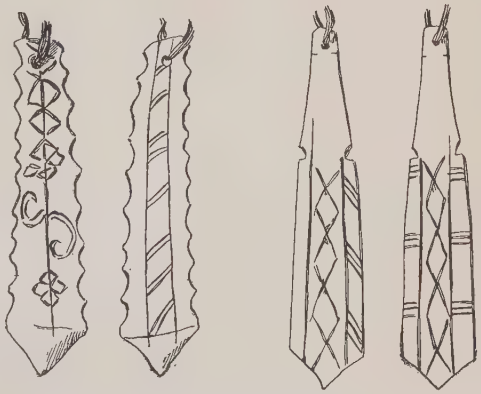


Fig. 199.
TLINGIT TABLETS.
Length, 3⅛ to 3¾ inches.
Cat. No. 168372*l*, *m*, U.S.N.M.

The ancestry of the book in Eastern Asia may be traced, not only to the engraved strips of bamboo (Chinese *ch'ak*), but,

[1] Hepburn. A more obvious explanation would be found in *tán ch'ak*, a single slip of bamboo.

in the opinion of the writer, to the bundle of engraved or painted arrow-derived slips used in divination. Indeed the Korean name for the pack of cards, *tjil*, is defined by the Chinese *tit*, applied in Korea to a complete set of volumes of the same work.

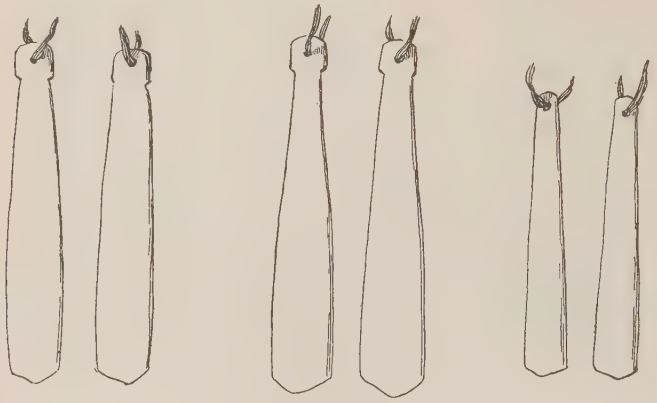


Fig. 200.

TLINGIT TABLETS.

Lengths, $3\frac{5}{8}$, $3\frac{11}{16}$, and $2\frac{7}{8}$ inches.

Cat. No. 168372*n*, *o*, *p*, U.S.N.M.

The folding fan of China and Japan is not unlikely to have originated from these *tanzaku* or writing slips, which the nobles carried in order to make memoranda when in the presence of the sovereign. The fan is constantly used for writing upon, one side originally being left blank for the purpose. In Japan a folding fan, *ogi* (fig. 202), formed an essential part of the ceremonial costume of a gentleman, and was carried in front in the belt. Referring to the folding fan, Mr. Giles says:

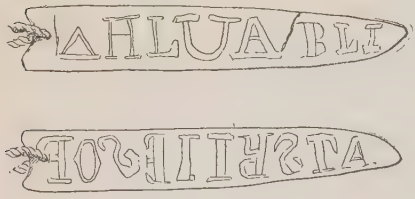


Fig. 201.

ALASKA INDIAN TABLET.

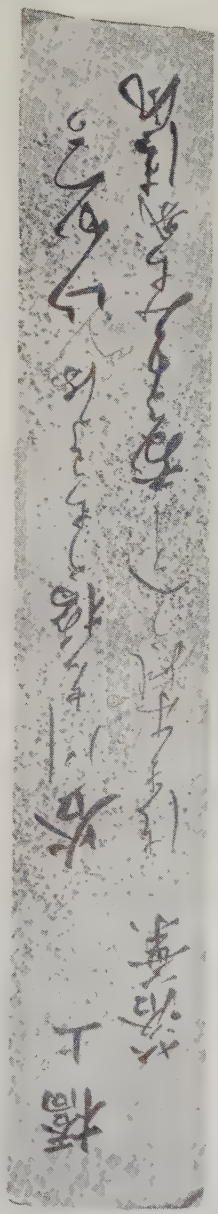
Length, 4 inches.

Alaska.

Cat. No. 15319, Museum of Archæology, University of Pennsylvania.

> The number of its bones or ribs is a matter which is by no means left to chance. Sixteen, including the two outer pieces, may be quoted as the standard; but fans made in certain localities have more, as many as thirty-two, and sometimes even thirty-six. The reason why the number sixteen is preferred is that such a fan opens into a convenient number of spaces to receive the poetical inscription, which custom has almost, but not altogether, tied down to a given number of lines.[1]

[1] Herbert A. Giles, On Chinese Fans, Historic China and other Sketches, London, 1882, p. 299.



TANZAKU.

Length, 14½ inches.

Japan.

In the author's collection.

65. YEKI. Divination. Japan.

Fifty splints of bamboo, *zeichaku*, and six wooden prisms, *sangi*.[1]

The sticks may vary in length from 2 to 14 inches, the set exhibited being 14 inches in length. The wooden prisms, which are usually made of *shitan*, or red sandalwood, have two contiguous sides plain and two marked with a transverse cut about 1 inch wide, which is painted red (fig. 203). These blocks, called *sangi*, or "calculating sticks," are placed before the fortune-teller, parallel to each other and with their plain faces uppermost. The fortune teller takes the bundle of splints in his right hand and raises them reverentially to his forehead. He then places the ends in the palm of his left hand and shuffles them with a rotary motion (fig. 204). Taking the bundle in his right hand, he places one so that it projects between his little finger and his third finger (fig. 205). Dividing the remainder in two parts, he places one of the bundles between his middle finger and forefinger and the other between his forefinger and thumb. The latter bundle is then counted, taking four splints at a time around the *Pát kwá* or "Eight Diagrams" (fig. 206), beginning at the one consisting of unbroken lines designated by the Chinese character *k'ín*, and corresponding with the Northwest. When the count has been made around the diagrams as many

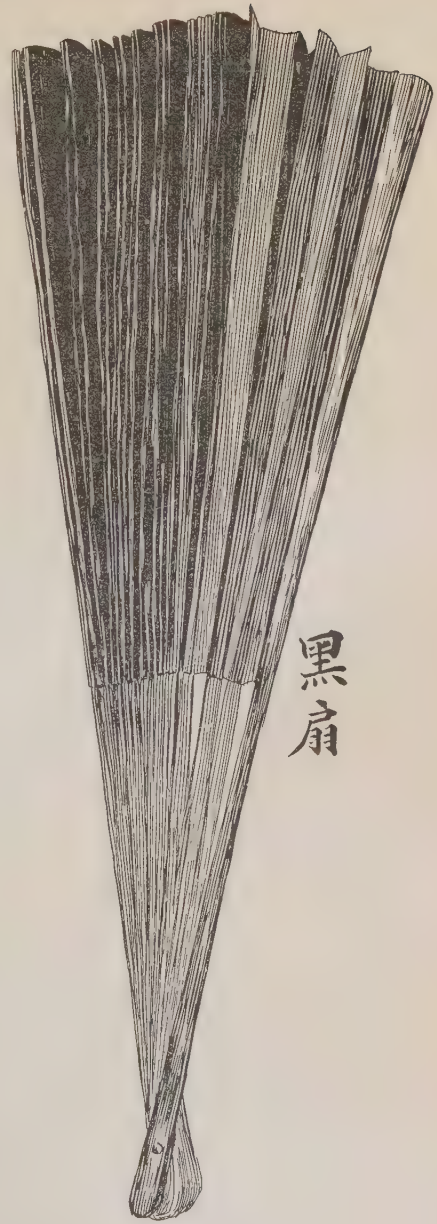


Fig. 202.
FOLDING FAN (*hak shin*, "black fan").
Length, 11¾ inches.
Canton, China.
Cat. No. 19401, Museum of Archæology, University of Pennsylvania.

[1] Cat. No. 175655, U.S.N.M. Gift of Stewart Culin.

times as possible there will remain less than eight sticks. This remainder indicates the complement of the destined diagram according to the arrangement shown in fig. 206.

The trigram indicated is then recorded by means of the *sangi*, the faces of the three nearest the fortune-teller being turned to correspond with the broken or unbroken lines of the trigram. The *zeichaku* are then again manipulated and the three remaining *sangi* turned in the same manner to agree with the trigram designated by the count. The indication obtained from these two operations is then referred to the corresponding diagram in the *Yik King* or "Divination Classic," and the fortune teller draws his conclusions from the text which explains it, aided by traditional interpretations.

In this system of divination we have an illustration of the use of arrow-derived splints divided at random to determine the number, place being ascertained by counting around a diagram, the *Pát kwá*, symbolic of the World Quarters. It is also practised at the present

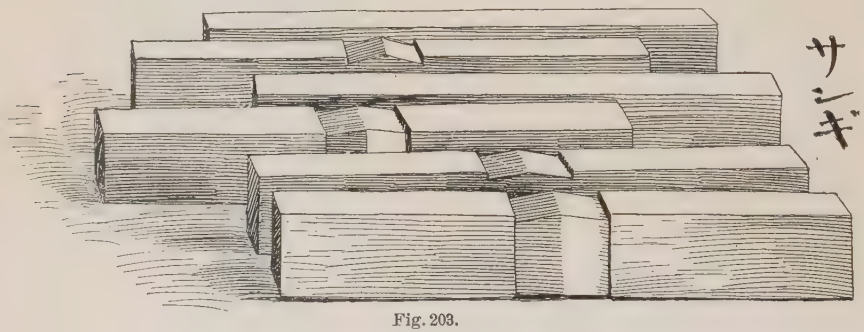


Fig. 203.
CALCULATING BLOCKS (*sangi*) FOR YEKI.
Length, 4½ inches.
Japan.
Cat. No. 175655, U.S.N.M.

day in Korea and in China, having doubtless been derived both in Japan and Korea from China. It is described minutely in one of the appendices to the "Divination Classic."[1] According to the Chinese record, the stalks of a plant, the *Ptarmica Siberica* were used, those which grew on the grave of Confucius being most highly esteemed.

The assumption that the *zeichaku* (Chinese, *shai chuk*)[2] were originally arrows is based upon analogy, the arrow derivation of many similar objects employed in divination being clearly apparent. The *sangi* (Chinese, *sün muk*), or "calculating sticks" may be regarded as sur-

[1] Appendix III, Chap. 9, p. 51.

M. C. de Harlez (Les Figures Symboliques du Yi-King, Journal Asiatique, New Ser. IX, p. 280) has given a translation of an explanation of the method of divination by means of the splints affixed to the Manchu-Chinese edition of the *Yik King* of the Emperor Kien Lung. A translation of the rules for divination with the sticks is given in Takashima Ekidan, Tokio, 1893.

[2] *Shai*, "to divine with slips of Milfoil; the most efficacious is from the grave of Confucius;" *Chuk*, "bamboo." Williams' Tonic Dictionary.

viving from or suggested by the two-faced staves, from which the diagrams originated.

The above-described method of divination has a counterpart in the Chinese game of *Fán t'án*, or "repeatedly spreading out," which is played in the gambling houses established by the immigrants from China in many American cities. *Fán t'án* is played with a quantity of Chinese brass "cash," for which buttons and other small objects are sometimes substituted. These take the place of the splints or *zeichaku*. The dealer covers a handful of these cash, taken at random from the pile, with a brass cup.[1] The players lay their wagers on the four sides of a square, numbered "one," "two," "three," and "four." The dealer then divides off the "cash" under the cup by fours, using for the purpose a tapering rod[2] of teak wood, about 18 inches in length. When all the fours are counted off, the winner is determined by the number remaining.[3] In these operations we have the random partition of "cash" substituted for that of splints, and the square with its four numbered sides (corresponding with the Four Quarters) for the *Pát kwá* or "Eight Trigrams" around which the splints are counted.

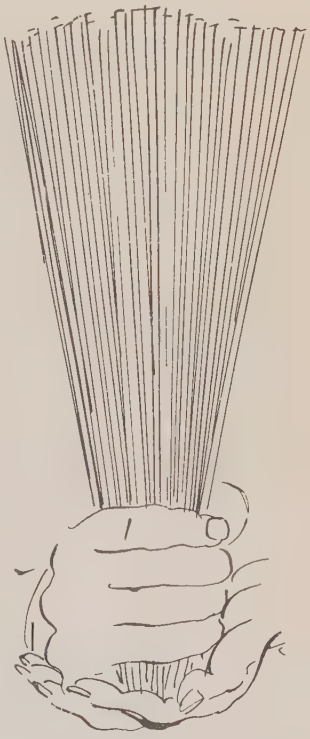


Fig. 204.
METHOD OF SHUFFLING ZEICHAKU.
Japan.
From Korean Games.

Analogous also to the Chinese and Japanese method of divination with splints is the Malagassy *Sikidy*, a system of fortune-telling in common use in Madagascar, in which beans, rice, or other small objects that can be easily counted or divided, are employed. A quantity of beans are placed in a heap, and from these a handful is taken at random. From this handful the diviner withdraws first two, then two more, and so on successively until two only are left, or, it may be, the odd number, one. The process is repeated and the remainders, one or two, are marked in tables of squares, from which the determinations are afterwards made.

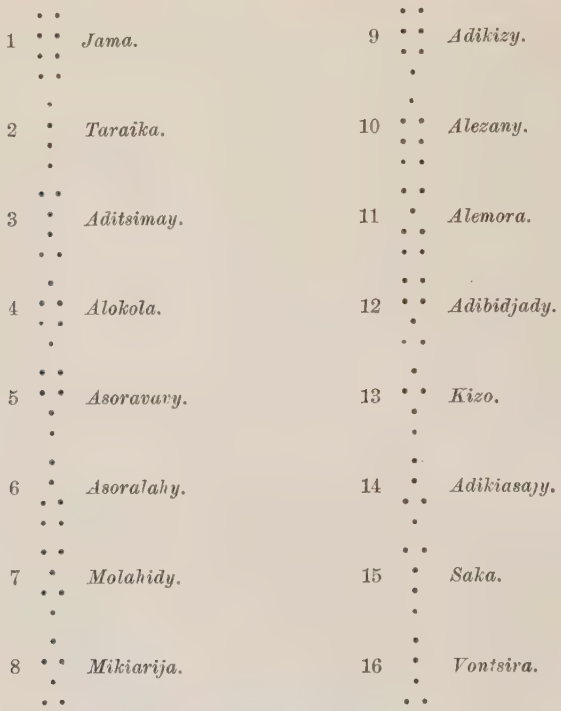
The method of marking down, by means of one or two dots, is identical with that frequently employed in divining with the splints. The process is repeated four times, one of sixteen combinations being

[1] *T'án k'oi* or "spreading out cover."

[2] *T'án pong*, "spreading-out rod."

[3] Stewart Culin, The Gambling Games of the Chinese in America, Philadelphia, 1891; also, The Origin of Fán t'án, Overland Monthly, August, 1896.

formed, which are given, with their Malagassy names, in the following table:



In order to explain the Malagassy names, which in part at least are Arabic, M. Steinschneider[1] gives a table, compiled from a Hebrew lot book in Munich, with the Arabic, Hebrew, Latin, and Berber designations of these combinations of dots. The figures, he states, are supposed to represent the astrological "houses" connected with the planets. They are distinguished as male and female—a distinction which we may assume exists in the single and double dots, as in the unbroken and broken lines. Steinschneider assumes that this supposed Arabic science was transplanted by scholars like Abraham ibn Essa and Jehuda al-Charisi, who traveled from Spain in Europe and the Orient in the twelfth and thirteenth centuries, through so-called lot books into Hebrew.

Sibree relates that in a simple form of *Sikidy* an indefinite number of grass stalks are counted off in twos until only one or two are left.[2]

[1] Zeitschrift d. deutschen morgenländischen Gesellschaft, XXXI, p. 762.

[2] For further references to *Sikidy* see:
Zeitschift d. deutschen morgenländischen Gesellschaft, XXXI, p. 543.
William Ellis, History of Madagascar, London, 1838, p. 431.
James Sibree, jr., Madagascar and Its People, London, 1870, p. 392.
James Sibree, jr., The Great African Island, London, 1880, p. 308.
James Sibree, jr., Madagascar before the Conquest, London, 1896, pp. 262, 285.
L. Dahle, Antanànarivo Annual, II, p. 80.

A method of fortune telling, based upon the sixteen combinations of single and double dots, taken four at a time, worked by means of a table not unlike that employed in *sikidy*, is to be found in a popular handbook entitled, "The Gypsy Dream Book and Fortune Teller," M. J. Ivers & Co., New York, under the title of "The Oraculum; or, Napoleon Buonaparte's Book of Fate."

The diagrams or dot combinations: . .. etc., are discovered by making four rows of dots at random : :: and afterwards counting them, even yielding . . and odd . ::

Reviewing the references in the Greek and Roman classics to divinatory practices with rods resembling those above described, there is to be found in Ammianus Marcellinus[1] the following account of the custom of the Alani:

They predict the future in a marvelous way. They take straight rods of osier, and, separating them with certain secret charms at a fixed time, they know clearly what is meant.[2]

Herodotus relates:

Scythia has an abundance of soothsayers, who foretell the future by means of a number of willow wands. A large bundle of these wands is brought and laid on the ground. The soothsayer unties the bundle and places each wand by itself,[3] at the same time uttering his prophecy. Then, while he is still speaking, he gathers the rods together again, and makes them up once more into a bundle. This mode of divination is of home growth in Scythia.[4]

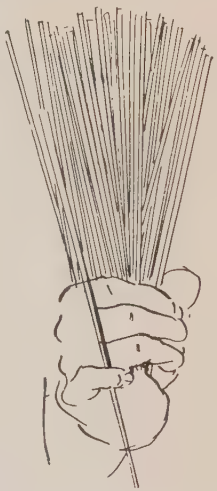


Fig. 205.

ONE STICK PLACED BETWEEN LITTLE FINGER AND THIRD FINGER.

From Korean Games.

The latter account does not agree except so far as concerns the bundle of rods, but almost exact parallels to the *zeichaku*, both in number and method of manipulation, are to be found among many aboriginal tribes in America. A résumé of the descriptions given by the early writers is furnished in that admirable paper on "Indian Games" by Mr. Andrew McFarland Davis, published in the Bulletin of the Essex Institute,[5]

[1] Volume XXXI, p. 2.

[2] Somewhat comparable is the custom of the Guinea negroes described by Bosman (William Bosman, A New and Accurate Description of the Coast of Guinea; translated in Pinkerton's Voyages, London, 1814, XVI, p. 399): "If the priest is inclined to oblige the querent the questions are put to the idol in his presence, and generally in one of the two following methods: The first way is by a bundle of about twenty small bits of leather, in the middle of which they bind some trash of the same nature with that they fill the mentioned pipe; some of these ingredients promise good success and others threaten the contrary. This bundle the priest shuffles together several times, and if those which presage a good issue happen to come frequently together he answers the querent that his undertaking shall end well."

[3] O. Schrader, "One behind another," Prehistoric Antiquities, translated by Frank Byron Jevons, London, 1890, p. 279.

[4] Book IV, 67, Rawlinson, New York, 1893, III, p. 46.

[5] Volumes XVII, Nos. 7–9, 1885; XVIII, Nos. 10–12, 1886.

under the caption of "Straw or Indian Cards," from which I have extracted the following:

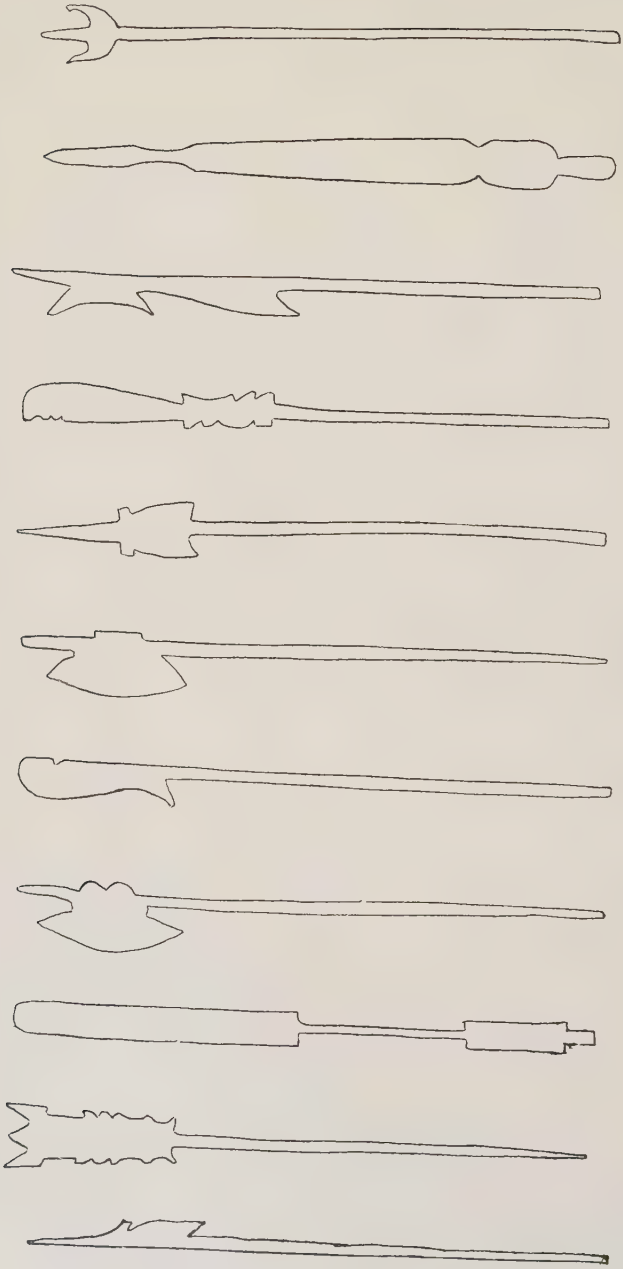
To play the game a number of straws or reeds uniform in size and of equal length were required. They were generally from 6 to 10 inches long. The number used in the game was arbitrary. Lawson puts it at fifty-one, Charlevoix at two hundred and one. The only essential points were that the numbers should be odd and that there should be enough of them so that when the pile was divided into two parts, a glance would not reveal which of the two divisions contained the odd number of straws. In its simplest form the game consisted in separating the heap of straws into two parts, one of which each player took, and he whose pile contained the odd number of straws was the winner. Before the division was made the straws were subjected to a manipulation, somewhat after the manner of shuffling cards. They were then placed upon the deerskin or upon whatever other article was selected as a surface on which to play. The player who was to make the division into two heaps, with many contortions of the body and throwing about of the arms, and with constant utterances to propitiate his good luck, would make a division of the straws with a pointed bone or some similar instrument,[1] himself taking one of the divisions while his adversary took the other. They would then rapidly separate the straws into parcels numbering ten each, and determine from the fractional remainders who had the odd number. The speed with which the process of counting was carried on was always a source of wonder to the lookerson, and the fact that the counting was done by tens is almost invariably mentioned. Between two people betting simply on the odd number no further rules were necessary. To determine which had the heap containing the odd number, there was no need to foot up the total number of tens. It was to be settled by what was left over after the last pile of complete tens was set aside. The number itself might be either one, three, five, seven, or nine. In the more complicated forms of the games this led to giving different values to these numbers, the nine being always supreme and the one on which the highest bets were wagered. It was generally understood that the holder of this number swept the board, taking all bets on other numbers as well as those on nine. It was easy to bet beads against beads and skins against skins in a simple game of odd or even, but when the element of different values for different combinations was introduced some medium of exchange was needed to relieve the complications.

Fig. 206.

EIGHT DIAGRAMS (*Pát kwá*).

Numerical compliments indicated by numerals.

[1] An explanation is here suggested for the origin of the familiar game of jackstraws, in which a bundle of splints allowed to fall at random in a pile are separated one by one without disturbing the others. Mr. E. W. Nelson informs me that a game identical with jackstraws is played by the Eskimo of Norton Sound on the Yukon River, Alaska. The sticks, which are made of spruce or cottonwood, or any ordinary driftwood, are about the size of a match, squared, and about four inches in length. Those he collected for the U. S. National Museum were tied with a cord in a bundle of about one hundred. The sticks each have the same value. They are separated by means of a slender stick a little longer than the others. Another method of using these sticks is to lay the bundle on the back of the hand, toss them

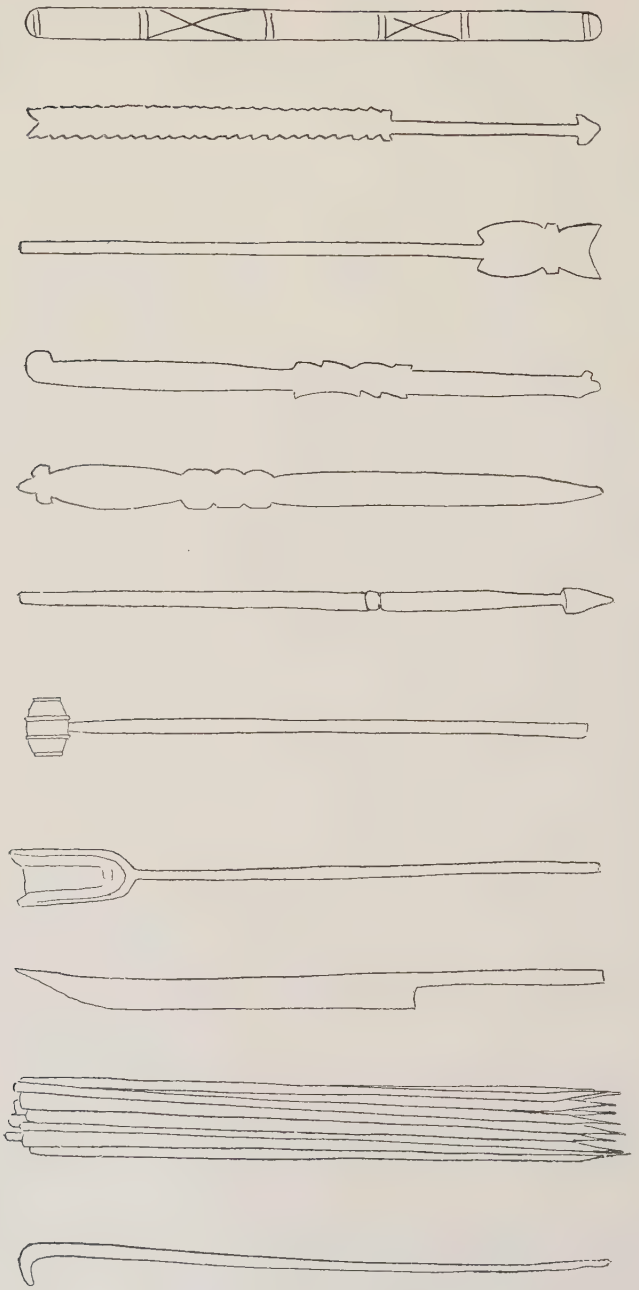


CARVED SANDALWOOD JACKSTRAWS (*Héung t'o pát pò*).

Length, 3⅛ inches.

Canton, China.

Cat. No. 16221, Museum of Archæology, University of Pennsylvania.



CARVED SANDALWOOD JACKSTRAWS.
Length, 3¼ inches.
Canton, China.
Cat. No. 16221, Museum of Archæology, University of Pennsylvania.

Stones of fruit were employed, just as chips or counters are used in modern gambling games, and a regular bank was practically instituted. Each player took a certain number of these counters as the equivalent of the value of the merchandise which he proposed to hazard on the game, whether it was a gun, a blanket, or some other article. Here we have all the machinery of a regular gambling game at cards, but the resemblance does not stop here. The players put up their bets precisely as they now do in a game of faro, selecting their favorite number and fixing the amount, measured in the standard of the game, which they wish to hazard. "By the side of the straws, which are on the ground, are found the (*grains*) counters," says Perrot, "which the players have bet on the game." In another place the method of indicating the bets is stated as follows: "He (meaning the one who has bet) is also obliged to make two other heaps. In one he will place five, in the other seven straws, with as many (*grains*) counters as he pleases. * * * Complicated rules determined when the players won or lost, when the bets were to be doubled, and when they were to abide the chance of another count. The loser at the game, even after all he had with him was gone, was sometimes permitted to continue the game on his promise to pay. If ill luck still pursued him the winner could refuse him credit and decline to play for stakes that he could not see. The game often lasted several days, one after another relieving his comrades at the play until one of the

Fig. 207.

JAPANESE FORTUNE-TELLER WITH ZEICHAKU.

After native drawing in Our Neighborhood, by T. A. Purcell, reproduced in Korean Games.

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into the air, and catch them on the palm. If the player succeeds in grasping them all he lays one splint aside and tries again.

The antiquity of the game of jackstraws in India appears to be illustrated by a passage in the Tevigga Sutta (The Magghima Sîlam, 4; The Sacred Books of the East, XI, Oxford, 1881, p. 193) in a list of games detrimental to the progress of virtue. "That is to say, with a board of sixty-four squares, or one hundred squares; tossing up; *removing substances from a heap without shaking the remainder.*"

In Canton, China, children use splints from burnt punk sticks (*héung k'euk*, literally, "incense feet"), one hundred being held in a bunch and allowed to fall, the players endeavoring to remove them one at a time from the pile without disturbing the others, using another stick bent over at the end for the purpose. They call the game *t'iú héung k'euk*. The Chinese at Canton make carved jackstraws, but I am informed by Chinese merchants that they are sold only for export. A set in the University Museum (Cat. No. 16221) (Plates 38, 39) consists of forty-two pieces, twenty small pointed sticks, twenty miniature weapons and implements, and two hooks for removing the splints. They are made of sandal wood, 4½ inches in length, and their name is given by the venders as *héung t'o pát pò*.

two sides had lost everything. * * * The game of straw," says Perrot,[1] from whose account we have made the foregoing digest, "is ordinarily held in the cabins of the chiefs, which are large, and are, so to speak, the Academy of the Savages."

Lawson[2] describes it, but in slightly modified form, as follows:

"Indian Cards.—Their chiefest game is a sort of Arithmetick, which is managed by a parcel of small split reeds, the thickness of a small Bent. These are made very nicely, so that they part, and are tractable in their hands. They are fifty-one in number, their length about 7 inches. When they play, they throw part of them to their antagonist. The art is to discover, upon sight, how many you have, and what you throw to him that plays with you. Some are so expert at their numbers that they will tell ten times together what they throw out of their hands. Although the whole play is carried on with the quickest motion it is possible to use, yet some are so expert at this game as to win great Indian Estates by this Play. A good set of these reeds fit to play withal are valued and sold for a dressed doe-skin."

The first game described by Roger Williams[3] in his Chapter on Gaming is "a game like unto the English Cards, yet instead of Cards they play with strong Rushes." In his vocabulary he gives "*Akésuog:* they are at cards, or telling Rushes; *Pissinné-*

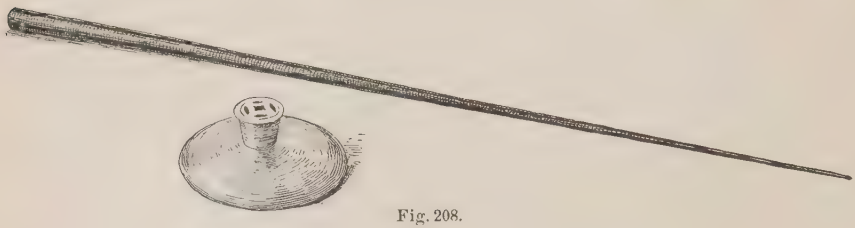

Fig. 208.

ROD AND COVER USED IN FÁN T'ÁN.

Length of rod, 17½ inches; diameter of cup, 3½ inches.

Canton, China.

Cat. Nos. 7159, 7160, Museum of Archæology, University of Pennsylvania.

ganash: their playing Rushes; *Ntakèsemin:* I am a telling or counting; for their play is a kind of Arithmatick." Strachey found this game among the Indians in Virginia. He describes it as follows: "Dice play, or cardes, or lotts, they know not, how be it they use a game upon rushes much like primero, wherein they card and discard and lay a stake or two, and so win or lose."

Mr. Davis cites other references to the game by Fathers Brebeuf,[4] Boucher,[5] Lafitau,[6] Charlevoix,[7] and Beverly,[8] none of which throw any additional light upon it.

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[1]Nicholas Perrot, Mémoire sur les Mœurs, Coustumes et Relligion des Sauvages de l'Amérique Septentrionale, Leipzig and Paris, 1867.

[2]John Lawson, History of North Carolina, London, 1718, p. 176. The tribes whose customs are described by him are Catawba, Tuskeruro (Tuscarora), Pampticough, and Woccon. He does not specify that the game was played by any one of these tribes in particular.

[3]Roger Williams, A Key to Language of America, etc., together with brief observations of the Customes, Manners, etc., Providence in New England, London, 1643, Chap. XXVIII.

[4]Relations des Jésuites, Quebec, 1858.

[5]Pierre Boucher, True and Genuine Description of New France, etc., Paris, 1644. Translated under title Canada in the Seventeenth Century, Montreal, 1883.

[6]P. Lafitau, Mœurs des Sauvages Ameriquains, etc., Paris, 1724.

[7]Le P. de Charlevoix, Historie de la Nouvelle France, Journal d'un Voyage, etc., Paris, 1744.

[8]Robert Beverly, History of Virginia, 1705.

About fifteen years ago the late Rev. J. Owen Dorsey gave the following account of a corresponding game among the Omaha:[1]

Ja^{n}-ç̣áwa, *Stick-counting*, is played by any number of persons with sticks made of déska or sidúhi. These sticks are all placed in a heap, and then the players, in succession, take up some of them in their hands. The sticks are not counted until they have been taken up, and then he who has the lowest odd number always wins. Thus, if one player had five, another three, and a third only one, the last must be the victor. The highest number that anyone can have is nine. If ten or more sticks have been taken those above nine do not count.[2]

Light is thrown upon the origin and significance of these games in America by the account of the *Tiyotipi* of the Dakota, by Stephen R. Riggs.[3] "The exponent of the Phratry was the 'Tiyotipi,' or 'Soldiers' Lodge.' Its meaning is the 'Lodge of Lodges.' There were placed the bundles of black and red sticks of the soldiers. There the soldiers gathered to talk and smoke and feast. There the laws of the encampment were enacted." Describing the lodge, he says:

A good fire is blazing inside, and we may just lift up the skin-door and crawl in. Toward the rear of the tent, but near enough for convenient use, is a large pipe placed by the symbols of power. There are two bundles of shaved sticks about 6 inches long. The sticks in one bundle are painted black and in the other red. The black bundle represents the real men of the camp—those who have made their mark on the warpath. The red bundle represents the boys and such men as wear no eagle feathers.

Again he says:

Then of all the round-shaved sticks, some of which were painted black and some painted red, four are especially marked. They are the four chiefs of the *Tiyotipi* that were made. And these men are not selected at random for this place; but men who have killed many enemies and are most able are chosen.

In conclusion, Mr. Riggs adds:

The special making of the sticks is done on the line of personal history. Whatever is indicated by the kind of eagle feathers a man is entitled to wear in his head, and by the notches in them, this is all hieroglyphed on his stick in the Tiyotipi. Then these bundles of sticks are used for gambling. The question is, "Odd or even?" The forfeits are paid in meat for the Tiyotipi.

This highly suggestive account reveals the splints or straws of the American games as derived from the ceremonial emblems of the warriors of the tribe. The identity of the splints with the Haida gambling-sticks (No. 76), both in number and method of use, is clearly apparent.

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[1] Omaha Sociology, Third Annual Report Bureau of Ethnology, Washington, 1884, p. 338.

[2] Mr. Francis Le Fleche mentioned an Omaha game to the writer under the name of *Zanĕ kiādé*, as played with sticks or straws, fifty-two in all. "It is pretty much like card-playing." Miss Alice C. Flecher writes me that "the true name of the game is *zthon-ni-gki-de*. This is an old word, and not a descriptive name, whereas the name given by Mr. Dorsey is a descriptive name and only sometimes used to designate this game. The name given by Mr. Dorsey, *zhon-dha-wa*, is composed of *zohn*, "wood," and *dha-wa*, "to count."

[3] Stephen Return Riggs, Dakota Grammar, Texts, and Ethnography, edited by James Owen Dorsey, U. S. Geographical and Geological Survey of the Rocky Mountain Region, Contributions to North American Ethnology, IX, pp. 195, 200.

The latter I have shown to be direct substitutes for arrow-shaftments, hence the derivation of the splints from similar shaftments may be regarded as assured.

66. CHINESE FORTUNE-TELLER'S SIGN. Cotton cloth painted[1] with the *Pát kwá* or "Eight Diagrams." Johore, Malay Peninsula.

67. KWÁ TS' ÍM. Divining-splints.[2] China and Chinese in the United States.

Thirty-two or sixty-four splints of bamboo, about 5 inches in length, tipped with red (fig. 209). One-fourth of the splints are marked with one dot and called *tán*, "single;" one-fourth with two dots, *chít*, "broken;" one-fourth with a circle, *ch'ung*, "duplicated," and the remainder with a cross, *káu*, "united." They are regarded, respectively, as *yéung*, "masculine;" *yam*, "feminine;" *shiú yéung* and *shiú yam*, *yam* meaning "assistant." The inquirer draws a splint at random from a vase in which the entire bundle is placed, and the fortune-teller notes its mark upon a piece of paper. Another splint is then drawn, and the result written down just above the former mark, and this repeated until six marks in a line, one above the other, are obtained. The combination is interpreted with the aid of the "Book of Divination," by reference to the corresponding diagram, as in *Yeki* (No. 65). In this method of fortune-telling the diagram indicating *place* is determined by the repeated selection of the chance-arrows.

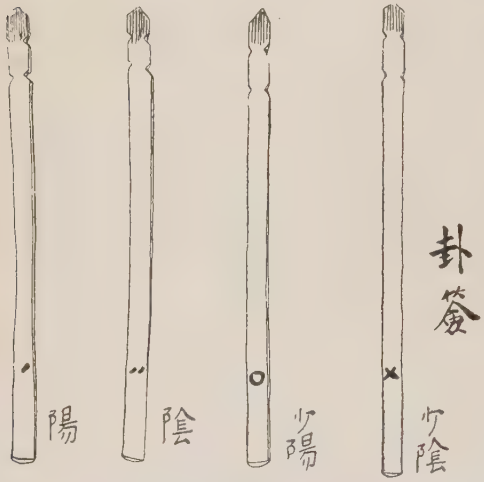

Fig. 209.
DIVINING-SPLINTS (*kwá ts'ím*).
Length, 5 inches.
China.
Cat. No. 175657, U.S.N.M. From Korean Games.

68. MIKUJI. Divining-sticks,[3] with box, *mikuji bako*, from which they are thrown. Japan.

Sixty bamboo lots, about 9 inches in length, marked with numbers from one to sixty (fig. 210). Kept in both Shinto and Buddhist temples in Japan. A lot is shaken from a box and its number referred to a book in which an explanation is given. Either sixty or one hundred lots are used. The even numbers are considered lucky and the odd

[1] Cat. No. 16760, Mus. Arch., Univ. Penn. From the collection sent by His Highness the late Sultan of Johore to the Columbian Exposition, Chicago.

[2] Cat. No. 175657, U.S.N.M. Gift of Stewart Culin.

[3] Cat. No. 175658, U.S.N.M. Gift of Stewart Culin.

SHRINE OF CHINESE GOD OF WAR.
Philadelphia.
From Korean Games.

unlucky, with the exception of No. 1, which is very lucky, and No. 100, which is very unlucky.

69. Ts'ÍM Ü. "Lot-answers"[1] in box, *ts'ím t'ung*, from which they are shaken. China and Chinese in the United States.

One hundred bamboo lots, about 10 inches in length (fig. 211), used in Chinese temples and shrines in the same manner as the preceding.

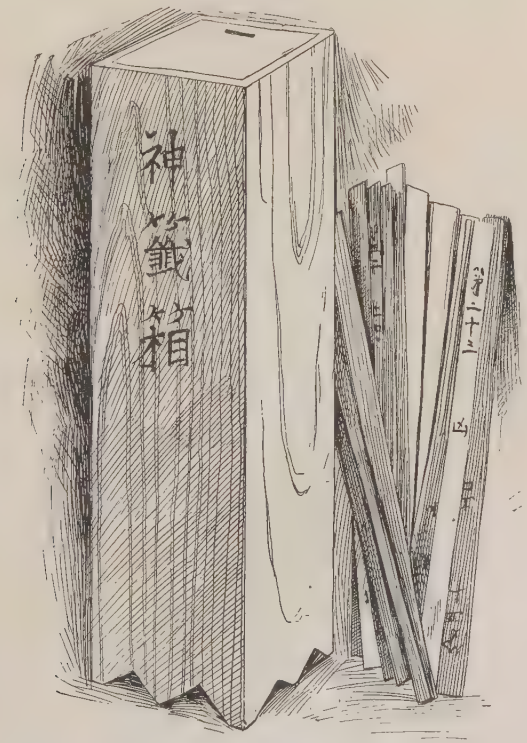

Fig. 210.

DIVINING-STICKS (*mikuji*) WITH BOX (*bako*), FROM WHICH THEY ARE THROWN.

Length of sticks, 9 inches.

Japan.

Cat. No. 18307, Museum of Archæology, University of Pennsylvania.

These lots illustrate the probable origin of the preceding lots, the Japanese *mikugi*, in the quiver of arrows, the red-tipped, arrow-pointed lots, *ts'ím*, being clearly derived from arrows, *tsín*, while the box, *t'ung*, represents the bamboo quiver.[2]

[1] Cat. No. 9048, Mus. Arch., Univ. Penn.

[2] Among the Chinese in the United States the God of War is invariably appealed to in using these lots. They are placed upon the little ledge, or altar before his shrine (Plate 40), which is maintained practically for the purpose of such divination. With the splints are invariably two elliptical pieces of wood, *káu púi* (fig. 212), rounded on one side and flat on the other, usually made of the root stock of the bamboo. The inquirer, after making the usual sacrifices, throws the blocks to

These instruments, taken in connection with a set of arrows worn by a Chinese general, described on page 882, serve to make clear the reference in Ezekiel xxi, 21, where Nebuchadnezzar, at the parting of two ways, uses divination with arrows to decide whether he shall proceed against Jerusalem or Rabbah.[1]

Fig. 211.

ROW-LOTS (*ts'ím ü*) IN BOX (quiver).

Length of sticks, 10 inches.

Canton, China.

Cat. No. 9048, Museum of Archæology, University of Pennsylvania.

Analogous to the *ts'ím ü* was the *Meisir* game of the heathen Arabs,

ascertain whether the time is propitious for divination with the *ts'ím ü*. In tossing the blocks, if both fall with their curved sides uppermost the indication is a negative one, neither good or evil; if both fall with the flat sides uppermost the indication is unfavorable; if one falls with the curved side uppermost and the other the reverse the indication is good. It is customary to throw the blocks until they fall three times alike in succession.

[1] "For the king of Babylon stood at the parting of the ways, at the head of two ways, to use divination. *He shook the arrows to and fro*, he consulted the teraphim, he looked in the liver" (R. V.).

in which marked arrows were shaken from a quiver. Ten or eleven arrows were used, of which seven were marked. They were made of the wood of a particular tree, and were of a yellow color. The seven marked arrows which had distinguishing notches on the shaftment were each designated by a name.

A very complete account of the game is given by Dr. Anton Hüber,[1] of which an extract is to be found in Korean Games, XXXIII.

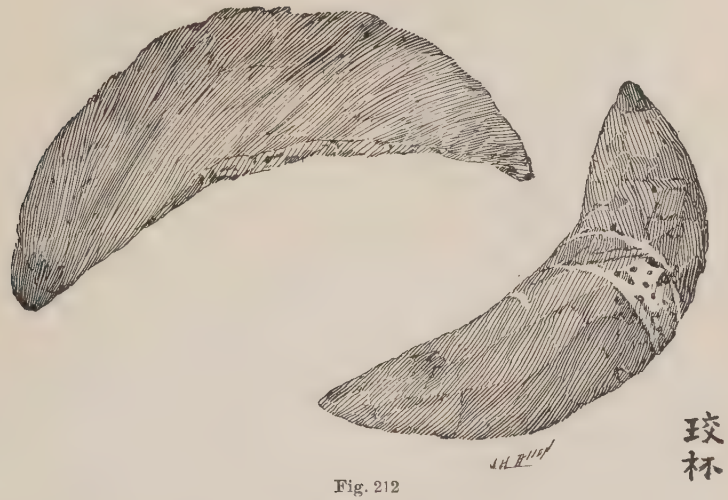

Fig. 212
DIVINING-BLOCKS (*kâu pûi*).
Length, 6½ inches.
China.
Cat. No. 9047, Museum of Archæology, University of Pennsylvania.

It should be observed that the term *al maisar* (*meisir*) is now understood to include all games of chance or hazard.[2] The heathen Arabs were accustomed to divine by means of arrows in a manner similar to the *Meisir*, of which an account is found in the Preliminary Discourse to Sale's Koran.[3]

[1] Über das Meisir genannte Spiel der heidnischen Araber, Leipzig, 1883.

[2] Hughes' Dictionary of Islam.

[3] Another practice of the idolatrous Arabs, forbidden also in one of the above-mentioned passages (Koran, Chap. V), was that of divining by arrows. The arrows used by them for this purpose were like those with which they cast lots, being without heads or feathers, and were kept in the temple of some idol, in whose presence they were consulted. Seven such arrows were kept at the temple of Mecca, but generally in divination they made use of three only, on one of which was written, "My Lord hath commanded me;" on another, "My Lord hath forbidden me," and the third was blank. If the former was drawn, they looked upon it as an approbation of the enterprise; if the second, they made a contrary conclusion; but if the third happened to be drawn, they mixed them and drew them over again. These divining arrows were generally consulted before anything of moment was undertaken, as when a man was about to marry, or about to go on a journey. (The Preliminary Discourse, Sec. V.)

While the Chinese lots at the present day are inscribed simply with a number referring to the corresponding pages of a book (as No. 70), in which is to be found both the oracle and its explanation, it is not unlikely that the oracle was originally engraved or written upon the lot itself, such lots being the natural outcome from the engraved or painted arrow shaftment, from which I assume they were derived. An explanation of the origin of the *sortes* of the Romans is naturally suggested. The *sortes* were little tablets or counters of wood, or other materials, upon each of which some rough verse or poverb was written. After they had been mixed together a boy would draw one at random, which was then taken as an omen.[1] Cicero[2] describes the *Sortes* at Præneste as being engraved in ancient characters on oak, and kept in a chest of olive wood.

70. KWÁN TAI LING TS'ÍM.[3] "God of War Divining Lots." Canton, China.

Book of lots, to which the numbered lots are referred.

71. PÁK KÒP P'IÚ TS'ÍM Ü.[4] Lots cast by gamblers. Canton, China.

Eighty bamboo lots, identical with No. 69, except that they are numbered from one to eighty. Cast by gamblers before playing in the lottery called the *Pák kòp p'iú* (No. 72) to determine the numbers they should play. Kept in Chinese shrines of the God of War in China and the United States for the convenience of gamblers.

These lots, which are used ceremonially to divine the lucky numbers, are doubtless survivals from the time when such lots were actually used in the drawings. In Korea, lotteries called *San-htong*, appear to be a distinct outcome from the *kyei*, or money-lending clubs. In the latter a hundred men each contribute a certain sum monthly, the drawings being made with numbered wooden balls, which are shaken from a globular wooden box, *san-htong*.[5] The lotteries are drawn in the same manner, and it should be observed that the name of the box, *san-htong*, is the Chinese *ts'ím t'ung*, applied to the lot-arrows in their quiver. The globular box and numbered balls are analogous to the Italian lottery, in which numbered balls (No. 74) are shaken from a bottle-shaped basket.

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[1] Smith's Dictionary of Greek and Roman Antiquities, art. *Sortes*.

[2] De Divinatio, II, p. 41.

[3] Cat. No. 15398, Mus. Arch., Univ. Penn.

[4] Cat. No. 9048, Mus. Arch., Univ. Penn.

[5] The implements for a Korean lottery (Cat. No. 17612) in the University Museum consist of a small tin lamp for burning kerosene oil, containing ten white nuts (seeds of *Salisburia adiantifolia*) numbered with Chinese characters from one to ten, an evident makeshift for the appliance described in the text.

Himly gives the Manchu name for the money-lending clubs as *isangga mekten*, "lot drawing," with the Chinese equivalent of *iú ui*, "shaking society." When several persons each deposit part of the money, and it is divided by lot-drawing once a month, it is called *isangga mekten*.

72. PÁK KÒP P'IÚ. "White Pigeon Ticket." Tickets used by players[1] (fig. 213). A lottery. China and Chinese in the United States. Carried on by organized companies among the Chinese in China and in their settlements in the United States. The tickets are marked with eighty numbers, which are represented by the first eighty characters of the "Thousand Character Classic." The players bet on ten or more numbers, marking the characters selected on the tickets. The draw-

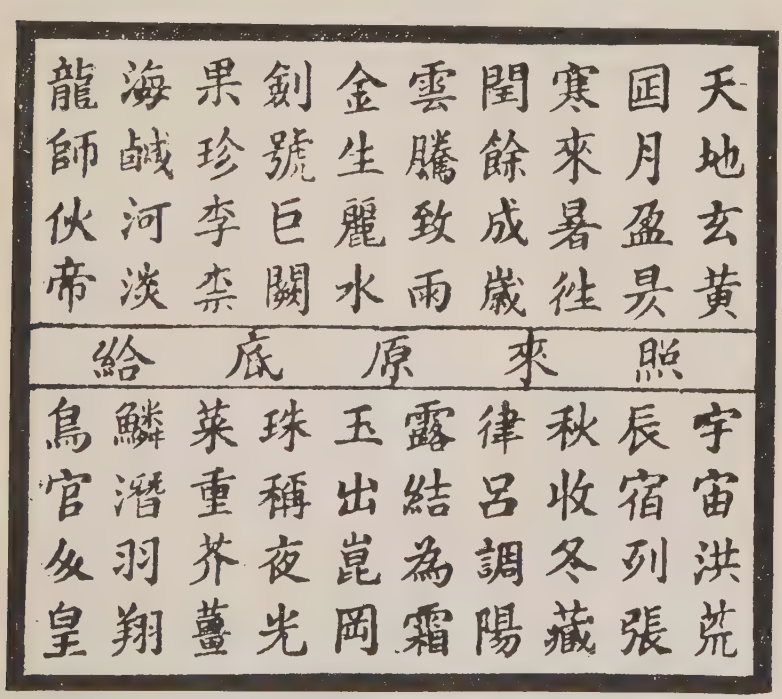


Fig. 213.

LOTTERY TICKET (*pák kòp p'iú*).

Impression, 3⅝ inches square.

Chinese in United States.

Cat. No. 169327, U.S.N.M. From Korean Games.

ings are conducted by means of eighty pieces of paper, each having one of the eighty characters written upon it. Twenty characters are drawn at random at each drawing, and the players win in proportion to the number they guess.[2] The name of the lottery, *pák kòp*, "White Pigeon," is probably a slang phrase for *pák hòp*, meaning "one hundred united," a name which is quite intelligible in the light of the Korean money-lending clubs.

[1] Cat. No. 169327, U.S.N.M. Gift of Stewart Culin.

[2] Stewart Culin, for detailed account see The Gambling Games of the Chinese in America, Philadelphia, 1891.

73. Tsz' FÁ. "Word-Blossoming." A lottery. Canton, China, and Chinese in the United States. Chart and Enigmas.[1]

A lottery similar to the preceding. The lots are the names of thirty-six persons, and appear upon the chart (fig. 214) arranged in nine categories:

Fig. 214.

CHART FOR WORD-BLOSSOMING LOTTERY (*tsz' fá t'ò*).

Impression, 8 by 9 inches.

China, and Chinese in United States.

Cat. No. 169328, U.S.N.M. From Korean Games.

1. The four *Chong ün.*[2]
2. The seven successful merchants.
3. The four Buddhist priests.
4. The five beggars.
5. The five generals.
6. The four ladies.
7. The four destined to good fortune.
8. The nun.
9. The two Taoist priests.

[1] Cat. No. 169328, U.S.N.M. Gift of Stewart Culin.

[2] The name given to those who take the highest degree at the examinations for the Hanlin.

One name is selected as the winning one before each drawing, and the players who guess it receive thirty times the amount of their bet. Below each of the proper names on the chart are the names of various animals, common occupations, of noted characters in the popular romances and histories, and of miscellaneous objects, such as "jade," "a corpse," and the "Tutelary Spirit." This heterogeneous collection, which somewhat resembles the list of objects in the dream books sold in our shops for the use of "policy" players, is employed by gamblers for a similar purpose. The picture of a man, marked with thirty-six names at various parts of his body, forms part of the same scheme. This employment is secondary to another purpose. Before drawing the lottery, the manager distributes among the players copies of an enigma (fig. 215), which must contain some demonstrable reference to the name written under the proper name selected for the day, or to the part of the body upon which that name is written. These enigmas are written in metrical form, and are composed as required by the writer of the lottery. He endeavors to mislead the players, but is obliged to give a satisfactory explanation of the connection between his verses and the name displayed.[1]

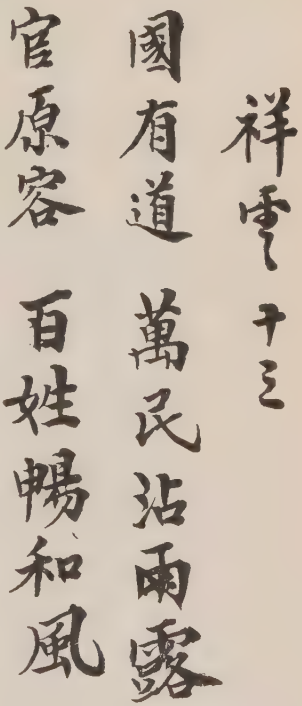


Fig. 215.

ENIGMA (*tsz' fá t'ai*) USED IN WORD-BLOSSOMING LOTTERY.

Chinese in United States.

From Korean Games.

For an explanation of the symbolism of the thirty-six names and of the *T'ung yan*, or "composite man," as the picture of the man is called, we need but to refer to the concept of totality which underlies the arrow-quiver with its symbols of all the quarters.

74. NUMBERED BALLS,[2] used in lottery. Madrid, Spain.

These balls (fig. 216) made of boxwood, are numbered from one to ninety. Their probable origin is suggested by the Korean *san-htong*, as described on page 902. The resemblance of these strung balls to a rosary has suggested to the writer that that object may have had a similar origin and cosmical symbolism.

75. ARROWS.[3] McCloud River Indians, McCloud River, California.

Feathered ends marked with rings or ribbons of red, blue, and black paint.

[1] For a detailed account see Stewart Culin, *Tsz' Fá*, or Word-Blossoming, Overland Monthly, September, 1894.

[2] Cat. No. 16247, Mus. Arch., Univ. Penn.

[3] Cat. No. 126518, U.S.N.M.

Intended to illustrate method of marking arrows referred to on page 881.

76. GAMBLING-STICKS. Alaska Indians.

(*a*) A set of sixty-two sticks, 5 inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch.[1] Marked with stripes or ribbons of red and black paint, of various widths, and variously placed. Collected by Dr. A. H. Hoff, U. S. A.

(*b*) Plaster cast of stick, showing carved figure of beaver. Copy of one of set in the United States National Museum[2] (Plate 41), Haida Indians, Queen Charlotte Islands, British Columbia.

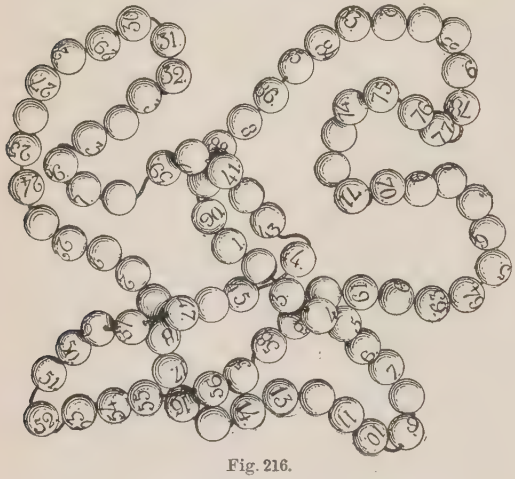


Fig. 216.

STRING OF NINETY LOTTERY BALLS.

Madrid, Spain.

Cat. No. 16247, Museum of Archæology, University of Pennsylvania.

Mr. James G. Swan[3] gives the following account of the method of play:

The Haida use sticks or pieces of wood 4 or 5 inches long and beautifully polished. They are made of yew, and each stick has some designating mark upon it. There is one stick entirely colored and one entirely plain. Each player will have a bunch of forty or fifty of these sticks, and each will select either of the plain sticks as his favorite, just as in backgammon or checkers the players select the black or white pieces. The Indian about to play takes up a handful of these sticks, and, putting them under a quantity of finely separated cedar bark, which is as fine as tow and kept constantly near him, he divides the pins into two parcels, which he wraps up in the bark, and passes them rapidly from hand to hand under the tow, and finally moves them round on the ground or mat on which the players are always seated, still wrapped in the fine bark, but not covered by the tow. His opponent watches every move that is made from the very first with the eagerness of a cat, and finally, by a motion of his finger, indicates which of the parcels the winning stick is in. The player, upon such indication, shakes the sticks out of the bark, and, with much display and skill, throws them one by one into the space between the players till the piece wanted is reached, or else, if it is not there, to show that the game is his. The winner takes one or more sticks from his opponent's pile, and the game is decided when one wins all the sticks of the other.

Dr. Franz Boas,[4] in his Report of the Northwestern Tribes of Canada, 1895, gives the following account of the methods of play among the Nĭskĭ́á (Chimmesyan):

Qsan.—Guessing game, played with a number of maple sticks marked with red or black rings, or totemic designs. Two of these sticks are trumps. The object of the

[1] Cat. No. 9286, U.S.N.M. [2] Cat. No. 73552, U.S.N.M.

[3] Smithsonian Contributions to Knowledge, No. 267, p. 7.

[4] British Association for the Advancement of Science, Ipswich, 1895.

EXPLANATION OF PLATE 41.

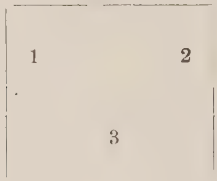
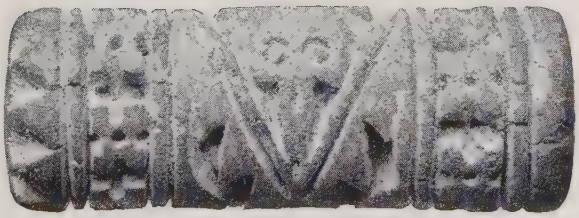


Fig. 1. Haida Indian Gambling Stick. Length, 4¾ inches.
(Cat. No. 73552, U. S. N. M.)

Fig. 2. Device on Haida Indian Gambling Stick (Beaver). From Korean Games.

Fig. 3. Cylindrical Stamp. Length, 3 inches.
(Cat. No. 12983, Mus. Arch., Univ. Penn. Ecuador.)



HAIDA GAMBLING STICK AND POTTERY STAMP.
Ecuador.

game is to guess in which of the two bundles of sticks, which are wrapped in cedar bark, the trump is hidden. Each player uses one trump only.

Another apparently similar game he describes as follows:

Matsqâ'n.—About thirty small maple sticks are divided into four or five lots of unequal numbers. After a first glance one of the players is blindfolded, the others change the order of the lots, and the first player must guess how many sticks are now in each lot. When he guesses right in three, four, or five guesses out of ten—according to the agreement of the players—he has won.

The sets of sticks are almost uniformly contained in a leather pouch, with a broad flap, to which a long thong is attached, passing several times around the pouch and having a pointed strip of bone, horn, or ivory at the end. The latter is slipped under the thong as a fastening. These sticks, which are used by several of the tribes of the northwest coast of America, are probably simply conventionalized shaftments of arrows, as will be seen by comparing them with the arrows of the McCloud River Indians (No. 75). Fig. 217 represents the cut shaftment of an actual arrow, still bearing bands of red paint, found among the débris of a cliff dwelling in Mancos Canyon, which Mr. Cushing regards as having been intended for a game in the manner of the sticks.

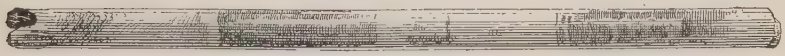


Fig. 217.

CUT ARROW SHAFTMENT.
Length, 6 inches.
Cliff dwelling in Mancos Canyon, Colorado.
Museum of Archæology, University of Pennsylvania.

From the account of the sticks used among the Dakota (p. 897), to which the Northwest Coast sticks are analogous, it seems probable that each stick in a set stands, or originally stood, for a warrior of the tribe. It will be seen from the sticks collected by Lieutenant Emmons that they are designated by what appear to be the names of the gentes. Comparison of the sticks herein described show that no two sets are exactly alike,[1] a variation which, under the circumstances, would be natural. Through the courtesy of Dr. Franz Boas, of the American Museum of Natural History, New York City, I am able to give the following list of two sets of sticks[2] in that museum, collected and labeled by Lieut. George T. Emmons, U. S. N., which are of the highest importance in their study. By reference to Gibb's Vocabularies, it appears they were obtained from the Taku tribe of the Koluschan family, occupying Taku Inlet, Alaska.[3] They are catalogued under the name of *Alh-kar*, from Sitka.

[1] There is a general agreement in the red and black ribbons, but the number and arrangement of these varies on the sticks in each set. Several sticks marked alike frequently occur, as in the named sets collected by Lieutenant Emmons. All of the painted sets contain sticks like those in these two sets.

[2] My attention was called to these sticks by my friend Mr. Cushing, who kindly placed his drawings of them at my disposal.

[3] United States Geographical and Geological Survey of the Rocky Mountain Region. Contributions to North American Ethnology, I, p. 121.

Set of fifty-seven polished maple gaming-sticks. (Cat. No. $\frac{E}{558}$), $4\frac{15}{16}$ inches in length, in leather pouch. All marked with red and black ribbons, and arranged in fifteen groups, as follows:

Eight designated as *Kitē*, "blackfish."
One as *Tieesh sakh'*, "starfish."
Four as *Kah*, "duck."
Ten as *Late-la-ta*, "sea gull."
Four as *Nork*, "sunfish."
Four as *Shuuko*, "robin."
Four as *Heon*, "fly."
Three as *Kar-shish-show*, "like a dragon-fly."
Three as *Tseeke*, "black bear."
Three as *Gowh*, "surf duck."
Four as *Larkar*.
Three as *Yah-ah-un-a*, "South Southerlee (*sic*)."
Three as *Ihk-ok-kohm*, "cross-pieces of canoe."
Two as *Kea-thlu*, "dragon-fly."
One as *Tis*, "moon."

Set of sixty-six polished wooden gaming-sticks. (Cat. No. $\frac{E}{600}$), $4\frac{15}{16}$ inches in length, in leather pouch. Twenty-seven of these sticks are marked with red and black ribbons, and arranged in nine groups, as follows (Plates 42, 43):

Four designated as *Kitē*, "blackfish." (Plate 42A.)
Three as *Lar-ish*, "four-pronged starfish." (Plate 42B.)
Three as *Kok-khatete*, "loon." (Plate 42C.)
Three as *Tuk-kut-ke-yar*, "humming-bird." (Plate 42D.)
Three as *Kark*, "duck" (golden eye). (Plate 42E.)
Three as *Dulth*, a bird like a heron without topknot. (Plate 42F.)
Three as *Kau-kon*, "sun." (Plate 42G.)
Three as *Ars*, "stick-tree." (Plate 42H.)
Two as *Ta-thar-ta*, "sea gull." (Plate 42J.)

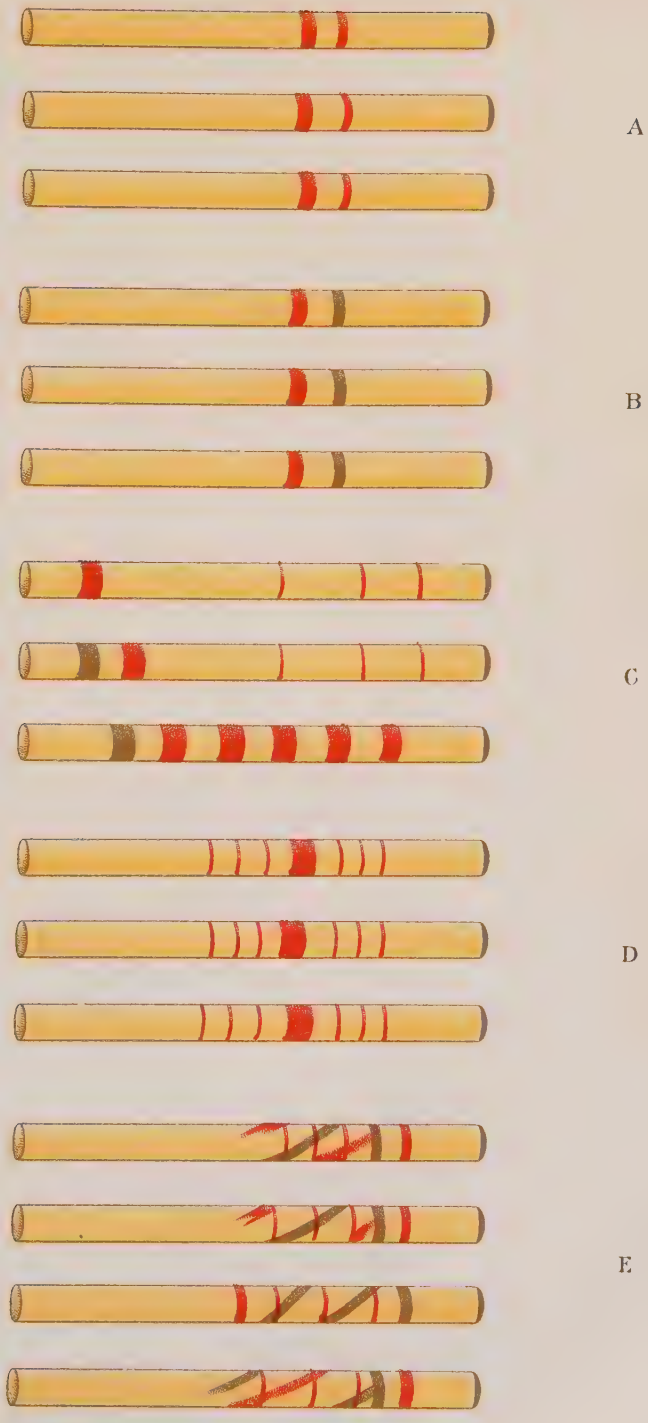
The remaining thirty-eight sticks are plain, but some show old bands, obliterated, but not removed, while two are inlaid with a small, rectangular piece of black horn (Plate 42 K), and one with a small ring of copper wire.

The following additional sets of sticks are contained in the American Museum of Natural History, New York City:

Set of forty-three maple gambling sticks. (Cat. No. $\frac{E}{596}$), $5\frac{4}{16}$ inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. One plain, others marked with red and black ribbons. Ends nipple-shaped. Tlingit; Fort Wrangell, Alaska. Collected by Lieut. George T. Emmons.

Set of forty-six wooden gambling-sticks. (Cat. No. $\frac{E}{599}$), $5\frac{1}{16}$ inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. All marked with red and black ribbons. Ends flat, blackened by charring. Tlingit; Sitka, Alaska. Collected by Lieut. George T. Emmons.

Set of sixty-two polished maple gambling-sticks (Cat. No. $\frac{E}{601}$), $4\frac{4}{16}$ inches in length and $\frac{4}{16}$ inch in diameter, in leather pouch. Painted with red and black ribbons, in part inlaid with abalone shell. One



TAKU INDIAN GAMBLING STICKS. ALASKA.

Length $4\frac{5}{16}$ inches. No. $\frac{E}{558}$, American Museum of Natural History, New York.

TAKU INDIAN GAMBLING STICKS. ALASKA.

Length $4\frac{5}{16}$ inches. No. $\frac{E}{558}$, American Museum of Natural History, New York.

carved with head of a man. Ends ovate. Tlingit; Sitka, Alaska. Collected by Lieut. George T. Emmons.

Set of sixty-seven maple gambling-sticks (Cat. No. $\frac{E}{60\,2}$), $4\frac{4}{16}$ inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. All marked with red and black ribbons. Ends ovate. Tlingit; Sitka, Alaska. Collected by Lieut. George T. Emmons.

Set of forty-three wood gambling-sticks (Cat. No. $\frac{E}{60\,3}$), $4\frac{12}{16}$ inches in length and $\frac{4}{16}$ inch in diameter, in leather pouch. Twenty-two painted with red and black ribbons; others plain. Ends have small raised flat disk. Collected by Lieut. George T. Emmons.

Sixteen maple gambling-sticks (Cat. No. $\frac{E}{10\,19}$), $4\frac{3}{16}$ inches in length and $\frac{5}{16}$ inch in diameter, marked with red and black ribbons, and six with burnt totemic designs. Ends ovate. With the above are ten odd sticks belonging to six or seven different sets. Chilkat. Collected by Lieut. George T. Emmons.

Set of fifty-three wood gambling-sticks (Cat. No. $\frac{E}{10\,58}$), $4\frac{12}{16}$ inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. All marked with red and black ribbons, and having each end incised with three crescent-shaped marks suggesting a human face. In part inlaid with small pieces of abalone shell and small rings of copper wire. Ends flat. Stahkin. Collected by Lieut. George T. Emmons.

Set of forty-nine wood gambling-sticks (Cat. No. $\frac{E}{2\,2\,74}$), $3\frac{3}{16}$ inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. All painted with red and black ribbons. Ten inlaid with small pieces of abalone shell, copper, and horn. Ends flat. Tlingit; Fort Wrangell. Collected by Lieut. George T. Emmons.

Set of sixty maple gambling-sticks (Cat. No. $\frac{16}{6\,8\,2}$), $5\frac{4}{16}$ inches in length and $\frac{7}{16}$ inch in diameter, in leather pouch. All marked with red and black ribbons. Haida. Collected by Dr. J. W. Powell.

Set of eighty-eight wood gambling-sticks (Cat. No. $\frac{16}{6\,8\,3}$), 5 inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. All painted with red and black ribbons. Two sticks carved at one end with human heads, one having right arm and leg of human figure below and the other their complement. Ends flat. Single-pointed paint-stick in pouch. Haida. Collected by Dr. J. W. Powell.

Set of fifty-four light-colored wood gambling-sticks (Cat. No. $\frac{16}{7\,4\,4}$), about $4\frac{12}{16}$ inches in length and $\frac{5}{16}$ inch in diameter. Length slightly irregular. In leather pouch. All marked with red and black ribbons. Ends flat. Double-pointed paint-sticks, one end red, other black, in pouch. Bellabella. (Wakashan.) Collected by Dr. J. W. Powell.

Set of seventy-two wood gambling-sticks (Cat. No. $\frac{16}{7\,4\,4}$), $5\frac{4}{16}$ inches in length and $\frac{6}{16}$ inch in diameter, in leather pouch. All marked with red and black ribbons and burnt totemic designs. Ends hollowed. Paint-stick in pouch. Bellabella. Collected by Dr. J. W. Powell.

Set of sixty-one wood gambling-sticks (Cat. No. $\frac{16}{7\,8\,5}$), $5\frac{3}{16}$ inches in length and $\frac{6}{16}$ inch in diameter, in leather pouch. Three plain; others

painted with red and black ribbons. Four inlaid with small disks and rectangles of abalone shell. Ends nipple-shaped and inset with disks of abalone shell. Tsimshian. Collected by Dr. Franz Boas.

Set of sixteen willow gambling-sticks (Cat. No. $\frac{16}{944}$), $5\frac{6}{16}$ inches in length and $\frac{3}{16}$ inch in diameter, in small fringed buckskin pouch, stitched with an ornamental figure in red and green silk. All marked with ribbons of red paint. Nslakyapamuk (Thompson River Indians Salishan) Interior of British Columbia. Collected by Mr. James Teit.

The following sets of sticks are in the Museum of Archæology of the University of Pennsylvania:

Set of forty alder wood gambling-sticks (Cat. No. 15322), $4\frac{15}{16}$ inches in length and $\frac{6}{16}$ inch in diameter, in leather pouch. In part marked with red and black ribbons, in part with obliterated ribbons, and in part plain. Ends hollow, showing pith. Originally filled with some white substance. Northern Alaska. Collected by Lieut. Miles C. Gorgas, U. S. N.

Set of forty-four polished maple gambling-sticks (Cat. No. 15491), $4\frac{13}{16}$ inches in length and $\frac{6}{16}$ inch in diameter, in leather pouch. All marked with red and black ribbons. Ends flat.

Set of forty-seven alder wood gambling-sticks (Cat. No. 15492), $5\frac{2}{16}$ inches in length and $\frac{6}{16}$ inch in diameter, in leather pouch. Thirty-two are marked with red and black ribbons and fifteen are plain. Ends inset with shell beads. Two banded sticks from another set are also contained in the pouch.

Set of sixty-three polished birch or larch wood gambling-sticks (Cat. No. 18372), $5\frac{3}{16}$ inches in length and $\frac{6}{16}$ inch in diameter, in leather pouch. All marked with red and black ribbons. Ends flat.

The following sets of sticks are in the Field Columbian Museum, Chicago.[1]

Set of fifty-five wood gambling sticks (Cat. No. 18349), $4\frac{3}{4}$ inches in length, in leather pouch. Variously figured. Ends rounded. Bella coola; British Columbia. Collected by Dr. Franz Boas.

Set of twenty-four wood gambling-sticks (Cat. No. 18348), $4\frac{1}{2}$ inches in length, in leather pouch. Twenty-one painted in various ways, and three carved to represent human figure. Bellacoola; British Columbia. Collected by Dr. Franz Boas.

Set of forty-two wood gambling-sticks (Cat. No. 18350), $4\frac{3}{4}$ inches in length, in leather pouch. Variously marked with colored ribbons. Ends rounded. Bellacoola; British Columbia. Collected by Dr. Franz Boas.

Set of sixty-five wood gambling-sticks (Cat. No. 19017), $4\frac{5}{8}$ inches in length. Marked with colored ribbons. Ends rounded. Kwakiutl. Collected by Dr. Franz Boas.

[1] I am indebted to Prof. William H. Holmes for the detailed information here given.

Set of sixty-one wood gambling-sticks (Cat. No. 14396), $4\frac{3}{4}$ inches in length, in leather pouch. Variously marked with colored ribbons. Ends flat. No tribe; no locality. Ayer collection.

Set of fifty-seven wood gambling-sticks (Cat. No. 14395), 5 inches in length, in leather pouch. Five inlaid with abalone shell, one with two small round pieces near middle, one with a single piece near the middle, and three with a single piece near the end. Ends flat. Alaska. Ayer collection.

Set of forty-three wood gambling-sticks (Cat. No. 14397), $4\frac{3}{4}$ inches in length, in leather pouch. Variously figured in color. No tribe; no locality. Ayer collection.

The following sets of sticks are in the United States National Museum:

Set of thirty-one alder-wood gambling-sticks (Cat. No. 9939), 5 inches in length and $\frac{7}{16}$ inch in diameter, in leather pouch. Sixteen marked with red and black ribbons and twelve unpainted. Three of the latter are inlaid with a piece of abalone shell. Ends hollow. Sitka, Alaska. Collected by Captain Henriques.

Set of forty-five whitewood gambling-sticks (Cat. No. 10311), $4\frac{7}{8}$ inches in length and $\frac{4}{16}$ inch in diameter. With one exception marked with fine and deep lines cut in the wood—in part with red and black painted ribbons, and eighteen with a threefold oblique-spiral ribbon lightly burned around the stick. Ends flat. British Columbia (Nisse River). Collected by Lieut. F. W. King, U. S. A.

Set of forty-four polished wood gambling-sticks (Cat. No. 11389), $5\frac{3}{16}$ inches in length and $\frac{6}{16}$ inch in diameter, in leather pouch. Sixteen marked with red and black ribbons and the remainder plain. Ends slightly pointed. Sitka, Alaska. Collected by Mr. Vincent Colyer.

Thirty-four wood gambling-sticks (Cat. No. 46487), parts of three sets. Ten $4\frac{3}{4}$ inches, fifteen $5\frac{1}{16}$ inches, and nine $5\frac{1}{2}$ inches in length. All marked with black and red ribbons. Chilkat. Collected by Commander L. A. Beardslee, U. S. N.

Set of fifty-eight wood gambling-sticks (Cat. No. 45974), 5 inches in length and $\frac{6}{16}$ inch in diameter, in pouch of woven grass. All painted with red and black ribbons, in part obliterated. Ends hollow. Sitka, Alaska. Collected by Mr. John J. McLean.

Set of forty-seven cedar and spruce gambling-sticks (Cat. No. 60223), $5\frac{2}{16}$ inches in length and $\frac{6}{16}$ inch in diameter, in leather pouch. Forty-five marked with red and black ribbons; in part obliterated, remainder plain. Ends ovate. Alaska. Collected by Mr. John J. McLean.

Set of sixty-nine polished wood gambling-sticks (Cat. No. 67899), $4\frac{15}{16}$ inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. Fifty-six marked with red and black ribbons and thirteen plain. The pouch also contains an odd stick from another set. Ends slightly pointed. Chilkat; Alaska. Collected by Mr. John J. McLean.

Set of fifty-five cedar gambling-sticks (Cat. No. 74258), 5 inches in length and $\frac{5}{16}$ in diameter, in leather pouch. Thirty marked with red and black ribbons and twenty-five plain. Ends flat. Alaska. Collected by Mr. John J. McLean.

Set of thirty-three spruce gambling-sticks (Cat. No. 75422), $5\frac{1}{16}$ inches in length and $\frac{11}{16}$ inch in diameter, in leather pouch. Thirty-three marked with red and black ribbons, and all, with three exceptions, inlaid with from one to nine[1] strips of abalone shell of a variety of patterns—round, oval, rectangular, crescent, leaf-shaped, and triangular. Three have nearly obliterated outline paintings of animal designs, and two are deeply carved, one with a human head, painted red, near both ends, and the other with a single head, similarly painted, and having a flat labret of abalone shell inserted. Ends nipple-shaped. The inner side of the flap of the pouch is painted in green, red, and black, with a conventional animal. Sitka, Alaska. Collected by Mr. John J. McLean.

Set of sixty-eight wood gambling-sticks (Cat. No. 75423), $4\frac{3}{4}$ inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. All marked with red and black ribbons. Ends flat, inset with small disks of abalone shell. Sitka, Alaska. Collected by Mr. John J. McLean.

Set of fifty-seven bone gambling-sticks (Cat. No. 67909*a*), $4\frac{15}{16}$ inches in length and $\frac{5}{16}$ inch in diameter, with hole drilled near one end for stringing. All engraved with fine encircling lines. One is inset with rectangular strip of abalone shell and one with rectangular piece of ivory, and has another hole, similarly shaped, from which the ivory has been removed. Six others have deep square and triangular holes for the insertion of slips of ivory or shell, and twelve are engraved with conventional animal designs, of which five have holes for the insertion of ivory eyes. Ends flat. Chilkat; Alaska. Collected by Mr. John J. McLean.

Set of thirty-nine bone gambling-sticks (Cat. No. 67909*b*), $4\frac{1}{16}$ inches in length and $\frac{4}{16}$ inch in diameter, with hole drilled near one end for stringing. All engraved with fine encircling lines. One has two deep rectangular holes for the insertion of abalone shell, which has been removed. One has row of three dots and three dotted circles. Four are engraved with conventional animal designs. Chilkat; Alaska. Collected by Mr. John J. McLean.

Set of forty-two bone gambling-sticks (Cat. No. 75421), $4\frac{3}{16}$ inches in length and $\frac{3}{16}$ inch in diameter. All engraved with fine encircling lines. One has deep hole with a slip of abalone shell inserted, and four have similar holes from which shell has been removed. Five of the sticks are fragmentary, and the tips of many apparently show the action of fire. Ends flat. Alaska. Collected by Mr. John J. McLean.

[1] Seventeen with one, four with two, five with three, one with four, one with five, and one with nine pieces. When placed upon a smooth surface the weight of the shell causes the sticks to turn so that the inserted pieces are concealed.

Set of sixty-six[1] curly-grained cedar-wood gambling-sticks (Cat. No. 18908), $5\frac{1}{16}$ inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. All, with one exception, marked with red and black ribbons. Ends ovate. Sitka, Alaska. Collected by Mr. J. G. Swan.

Set of thirty polished wood gambling-sticks (Cat. No. 18936), 5 inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. Fifteen painted with red and black ribbons and fifteen plain. Ends flat. Sitka, Alaska. Collected by Mr. J. G. Swan.

Set of thirty-four swamp or spotted beech or hazel gambling-sticks (Cat. No. 20789), $4\frac{15}{16}$ inches in length, $\frac{7}{16}$ inch in diameter, in leather pouch. All marked with red and black ribbons and five inlaid with from one to three strips of abalone shell, rectangular, round, crescent, and triangular. Ten of the sticks not having shell inserted have lengthwise cracks filled with metallic iron. Ends nipple-shaped. Sitka, Alaska. Collected by Mr. J. G. Swan.

Set of fifty-one polished wood gambling-sticks (Cat. No. 20790), $4\frac{10}{16}$ inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. Nineteen marked with red and black ribbon and thirty-two plain. Ends flat. Sitka, Alaska. Collected by Mr. J. G. Swan.

Set of forty-six polished wood gambling-sticks (Cat. No. 89074), $5\frac{4}{16}$ inches in length and $\frac{6}{16}$ inch in diameter, in leather pouch. Forty-three marked with red and black ribbons and three plain. Ends have small flat annular projection. Queen Charlotte Islands, British Columbia. Collected by Mr. J. G. Swan.

Set of fifty maple gambling-sticks (Cat. No. 89180), 5 inches in length and $\frac{6}{16}$ inch in diameter, in leather pouch. All painted with red and black ribbons. Ends flat. Skidgate, British Columbia. Collected by Mr. J. G. Swan.

Set of sixty-four redwood cedar gambling-sticks (Cat. No. 20646), $5\frac{1}{4}$ inches in length and $\frac{1}{2}$ inch in diameter, in leather pouch, the inside of which is painted with figure of an animal. All painted with red and black ribbons. Bellabella; British Columbia. Collected by Mr. J. G. Swan.

Set of fifty-six maple gambling-sticks (Cat. No. 20647), $5\frac{1}{4}$ inches in length and $\frac{1}{2}$ inch in diameter, in leather pouch. All painted with red and black ribbons, and nineteen[2] inset with abalone shell in designs of circles, crescents, triangles, and rectangles. Ends flat. Fort Simpson, British Columbia. Collected by Mr. J. G. Swan.

Set of fifty-three curly-maple gambling-sticks (Cat. No. 88804), $5\frac{1}{8}$ inches long and $\frac{3}{16}$ inch in diameter, in leather pouch. All painted with red and black ribbons. One inlaid with one and another with two small rectangles of abalone shell. Queen Charlotte Islands, British Columbia. Collected by Mr. J. G. Swan.

[1] Catalogued as 68.

[2] Nine with one, six with two, and four with three pieces.

Set of thirty-two polished birch-wood gambling-sticks (Cat No. 73522), $4\frac{3}{4}$ inches in length and $\frac{8}{16}$ inch in diameter, in leather pouch, beautifully carved with designs in intaglio. Ends flat. Haida Mission, Jackson, Alaska. Collected by Mr. J. Loomis Gould in 1884.

Set of twenty-seven wood gambling-sticks (Cat. No. 6556), $4\frac{7}{8}$ inches in length and $\frac{10}{16}$ inch in diameter, in leather pouch. Carved with incised designs similar to, but not identical with, preceding. Sitka, Alaska. Collected by Mr. T. T. Minor.

The following sets are in the Peabody Museum of American Archæology and Ethnology, Cambridge, Massachusetts:

Set of forty-two wooden gambling-sticks (Cat. No. 203), $4\frac{1}{2}$ inches in length and $\frac{5}{16}$ inch in diameter, in leather pouch. Painted with red and black ribbons. Ends flat. Northwest Coast.

Thirty-seven wooden gambling-sticks (Cat. No. 203*a*), $4\frac{3}{4}$ inches in length and $\frac{5}{16}$ inch in diameter. Painted with red and black ribbons. Ends flat. Northwest Coast.

Seventeen wooden gambling-sticks (Cat. No. 203*b*), $4\frac{1}{2}$ inches in length and $\frac{5}{16}$ inch in diameter. Painted with red and black ribbons. Ends nipple-shaped. Northwest Coast.

Set of fifty-three wooden gambling-sticks (Cat. No. 1717), $4\frac{5}{8}$ inches in length and $\frac{3}{8}$ inch in diameter, in buckskin bag. Painted with red and black ribbons. Ends slightly rounded. Said to be Kolushan. Sitka, Alaska. Collected by Mr. E. G. Fast.

Set of forty-three wooden gambling sticks (Cat. No. 1718), $5\frac{1}{2}$ inches in length and $\frac{3}{8}$ inch in diameter, in a buckskin bag. Twelve are inlaid with haliotis shell and the majority of the sticks are painted and burned. Ends rounded. Said to be Kolushan. Sitka, Alaska. Collected by Mr. E. G. Fast.

Set of fifty-one wooden gambling-sticks (Cat. No. 48395), $5\frac{1}{8}$ inches in length and $\frac{1}{4}$ inch in diameter. Painted with red and black ribbons. Ends rounded. Collected by Mr. E. G. Fast.

Indian gambling-sticks in United States National Museum.

Museum No.	Number of sticks.	Material.	Design.	Ends.	Length.	Diameter.	Tribe.	Linguistic stock.	Place collected.	Collector.
					Inches.	*Inch.*				
9286	62	Wood	Painted		5	5/16			Alaska	Dr. A. H. Hoff, U. S. A.
9939	31	Alder	do	Hollow	5	7/16	Tlingit (?)	Koluschan	Sitka, Alaska	Captain Henriques.
10311	45	Wood	Painted and burnt.	Flat	4 7/8	4/16			Nisse River, Brit. Col	Lieut. F. W. Ring, U. S. A.
11389	44	do	Painted	Slightly pointed	5 3/16	5/16			Sitka, Alaska	Vincent Collyer.
46487	[1] 34	do	do				Chilkat	Koluschan		Com. L. A Beardslee, U.S.N.
45974	58	do	do	Hollow	5	6/16			Sitka, Alaska	John J. McLean.
60223	47	Cedar and spruce	do	Ovate	5 2/16	11/16			Alaska	Do.
67899	69	Wood	do	Slightly pointed	4 15/16	9/16	Chilkat	Koluschan	do	Do.
74258	55	Cedar	do	Flat	5	5/16			do	Do.
75422	33	Spruce	Painted and inlaid.	Nipple-shaped	5 1/16	11/16			Sitka, Alaska	Do.
75423	68	Wood	Painted	Flat, inset	4 3/4	6/16			do	Do.
67909a	57	Bone	Engraved	Flat	4 15/16	5/16	Chilkat	Koluschan	Alaska	Do.
67909b	39	do	do	do	4 7/16	4/16	do	do	do	Do.
75421	42	do	do	do	4 3/16	3/16			do	Do.
18908	66	Cedar	Painted	Ovate	5 1/16	5/16			Sitka, Alaska	J. G. Swan.
18936	30		do	Flat	5	5/16			do	Do.
20789	34	Swamp or spotted beech or hazel.	Painted and inlaid.	Nipple-shaped	4 13/16	10/16			do	Do.
20790	51	Wood	Painted	Flat	4 15/16	8/16			do	Do.
89074	46	do	do		5 1/16	6/16			Queen Charlotte Islands, Brit. Col.	Do.
89180	50	Maple	do	Flat	5	6/16			Skidgate, Brit. Col	Do.
20646	64	Redwood cedar	do		5 1/4	8/16	Bellabella		British Columbia	Do.
20647	56	Maple	Painted and inlaid.	Flat	5 1/4	8/16			Fort Simpson, Brit. Col	Do.
88804	53	Curly maple	do		5 1/8	3/16			Queen Charlotte Islands, Brit. Col.	Do.
73552	32	Birch	Carved	Flat	4 3/4	8/16	Haida		Haida Mission, Jackson, Alaska.	J. Loomis Gould.
6556	27	Wood	do	Hollow	4 7/8	10/16	Tlingit (?)	Koluschan	Sitka, Alaska	T. T. Minor.

[1] Parts of three sets.

Indian gambling-sticks in Museum of Archæology and Paleontology, University of Pennsylvania.

Museum No.	Number of sticks.	Material.	Design.	Ends.	Length.	Diameter.	Tribe.	Linguistic stock.	Place collected.	Collector.
					Inches.	*Inch.*				
15332	40	Alder	Painted	Hollow	$4\frac{15}{16}$	$\frac{6}{16}$			Northern Alaska	Lieut. Miles C. Gorgas, U. S. N.
15491	44	Maple	do	Flat	$4\frac{13}{16}$	$\frac{6}{16}$				
15492	47	Alder	do	Hollow, and inset with shell.	$5\frac{2}{16}$	$\frac{6}{16}$				
18372	63	Birch or larch	do	Flat	$5\frac{3}{16}$	$\frac{6}{16}$				

Indian gambling-sticks in Field Columbian Museum, Chicago.

18349	55	Wood	Painted	Rounded	$4\frac{3}{4}$		Bellacoola	Salishan	British Columbia	Dr. Franz Boas.
18348	24	do	3 carved; 21 painted.		$4\frac{1}{2}$		do	do	do	Do.
18350	42	do	Painted	Rounded	$4\frac{3}{4}$		do	do	do	Do.
19017	65	do	do	do	$4\frac{5}{8}$		Kwakiutl	Wakashan	do	Do.
14396	61	do	do	Flat	$4\frac{3}{4}$					
14395	57	do	Painted; 5 inlaid.	do	5					
14397	43	do	Painted		$4\frac{3}{4}$					

Indian gambling-sticks in American Museum of Natural History.

E 558	57	Maple	Painted		$4\frac{15}{16}$		Taku	Koluschan	Alaska	Lieut. George T. Emmons.
E 596	43	do	do	Nipple-shaped	$5\frac{1}{16}$	$\frac{5}{16}$	Tlingit	do	Fort Wrangel	Do.
E 599	46	do	do	Flat	$5\frac{1}{16}$	$\frac{5}{16}$	do	do	Sitka, Alaska	Do.
E 600	66	do	do		$4\frac{15}{16}$		Taku	do	Alaska	Do.
E 601	62	do	do	Ovate	$4\frac{3}{16}$	$\frac{4}{16}$	Tlingit	do	Sitka, Alaska	Do.
E 602	67	do	do	do	$4\frac{4}{16}$	$\frac{5}{16}$	do	do	do	Do.
E 603	43	Wood	do		$4\frac{12}{16}$	$\frac{4}{16}$		do		Do.

E 1019	16	Maple	do	Ovate	4 3/16	5/16	Chilkat	do		Do.
19 1058	53	Wood	Painted and carved.	Flat	4 7/16	5/16	Stahkin	do		Do.
E 2274	49	do	Painted	do	3 3/16	5/16	Tlingit	do	Fort Wrangel	Do
16 682	60	Maple	do		5 4/16	7/16	Haida	Skittagetan		Dr J. W Powell.
16 683	88	Wood	do		5	5/16	do	do		Do.
16 744	54	do	do	Flat	4 13/16	5/16	Bellabella	Wakashan		Do.
16 745	72	do	Painted and burnt totemic designs.	Hollowed	5 4/16	6/16	do	do		Do.
16 785	61	do	Painted and inlaid.	Nipple-shaped	5 3/16	6/16	Tsimshian	Chimmesyan		Dr. Franz Boas.
16 944	16	Willow	Painted	Flat	4 6/16	3/16	Nslakyapamuk (Thompson River Indians).	Salishan	Interior British Columbia.	James Teit.

Indian gambling-sticks in Peabody Museum of American Archæology.

203	42	Wood	Painted	Flat	4 1/8	5/16			Northwest Coast	
203a	37	do	do	do	4 2/8	5/16			do	
203b	17	do	do	Nipple-shaped	4 1/2	6/16			do	
1717	53	do	do	Slightly rounded	4 6/8	3/8		Koluschan (?)	Sitka, Alaska	E. G. Fast.
1718	43	do	12 inlaid with haliotis.	Rounded	4 7/8	3/8		do	do	Do.
48395	51	do	Painted	do	5 3/8	1/4				

The carved gambling-sticks furnish a suggestion as to the probable origin of the seal-cylinder such as was used in ancient Babylonia. Cylindrical stamps of unglazed pottery, pierced with a hole like the seal-cylinder of Asia, are found in various parts of America. Such a stamp from Ecuador, bearing a highly conventionalized device of a bird (Plate 41, fig. 3), might readily have been derived from a carved arrow-shaftment, and it is reasonable to believe that the Babylonian seal, often bearing devices of animals, and the carved gambling-stick, the emblem and symbol of a man, should have had a similar origin.[1]

The set of American Indian gambling-sticks may be regarded as the antitype of the pack of playing-cards, to which, as will appear from the Korean *htou-tjyen* (No. 77), they directly lead.

77. HTOU-TJYEN. Playing-Cards.[2] Korea.

(*a*) Pack of eighty cards.

(*b*) Reproduction of native pictures; gamblers playing *Htou-tjyen*.[3] (Plate 44.)

The cards consist of strips of oiled paper 8 inches long by $\frac{1}{4}$ inch wide. The backs are uniformly marked with the scroll as represented on fig. 218. The cards are divided into eight suits as follows (fig. 219):

Sa-răm (Chinese, *yan*), "man."
Moul-ko-ki (Chinese, *ü*), "fish."
Ka-ma-koui (Chinese, *ú*), "crow."
Kkoueng (Chinese, *chí*), "pheasant."
No-ro (Chinese, chéung), "antelope."
Pyel (Chinese, *sing*), "star."
Htok-ki (Chinese, *t'ó*), "rabbit."
Māl (Chinese, *má*), "horse."[4]

The cards of each suit are distinguished by numerals from 1 to 9 (fig. 220), the tenth card being designated as *tjyang*, "General." (Plate 44.) A variety of games are played with the cards in Korea, the games in general resembling those played with cards in China. At the present day a pack usually consists of forty to sixty cards of four or six suits instead of eight, and the suit marks are not represented upon the numeral-cards, as cards of all suits have precisely the same value in the commonest game.

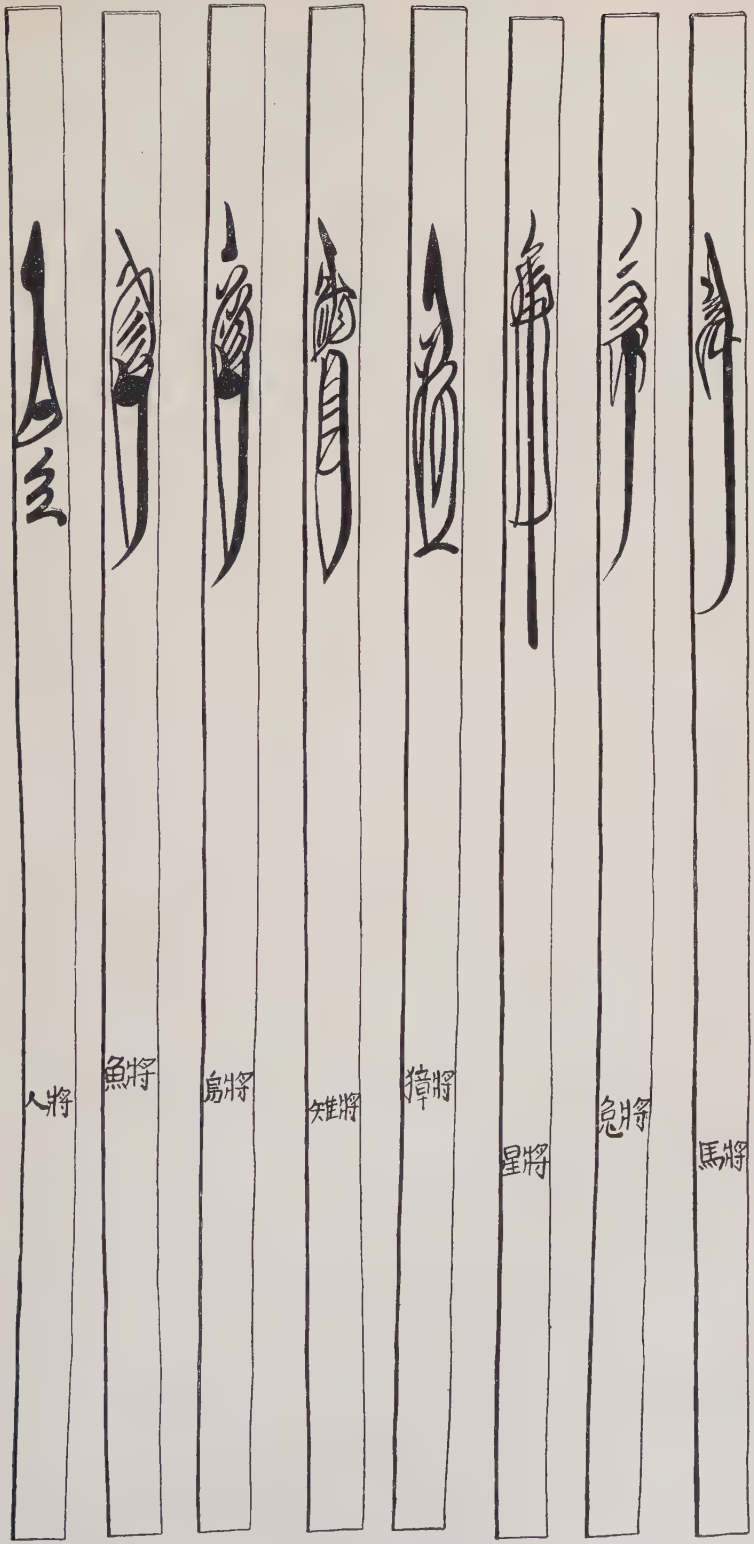
[1] Korean Games, p. xxxii. It is gratifying to the writer that his theory of the origin of the seal-cylinder should have received such ready acceptance and confirmation by his colleague, Prof. Herman V. Hilprecht, of the University of Pennsylvania. In his Old Babylonian Inscriptions (I, Pt. 2, Philadelphia, 1896, p. 36), he writes: "It becomes now very evident that the Babylonian seal-cylinder, with its peculiar shape and use, has developed out of the hollow shaft of an arrow marked with symbols and figures, and is but a continuation and elaboration in a more artistic form of an ancient primitive idea."

[2] Cat. No. 77047, U.S.N.M. Collected by Lieut. J. B. Bernadou, U. S. N.

[3] From Korean Games.

[4] These suit marks may be regarded as the symbols of the Eight Directions, and agree somewhat closely, though evidently earlier, with the Eight Creatures: Horse, Ox, Dragon, Fowl, Swine, Pheasant, Dog, Goat, associated with the Eight Diagrams.

KOREAN CARD PLAYING.
From painting by native artist, reproduced in Korean Games.



THE EIGHT "GENERAL" CARDS.

Korea.

The origin and significance of Korean playing-cards are revealed both by their designs and by their name. The latter, *htou-tjyen*, is the Chinese *tau tsín*, meaning "fighting tablets," *tsín* being a narrow slip intended to write on. Examining the reverse of the cards (fig. 218) the device is seen to represent the feather of an arrow. Comparison of the eighty cards with the eighty arrow-derived lots shows their practical identity, and we may conclude that the cards are highly conventionalized shaftments of arrows, retaining in their suit marks the same symbolism as that of the quiver of arrows from which they were derived. The Japanese *mikuji*, or "temple-lots" (No. 68), no doubt illustrate, both in form and material, an earlier stage of the present paper cards. Mr. Wilkinson informed me that the Koreans say that the "tens" or "General" cards once bore pictures, more or less carefully drawn, of the various emblems portrayed, of which the present scrawls are declared to be corruptions. This would seem to carry back, directly, the cards toward the type represented by the carved gambling-stick (No. 76 *b*).

Fig. 218.
REVERSE OF KOREAN PLAYING-CARD SHOWING ARROW FEATHER.
Length, 7§ inches.
From Korean Games.

Of the Korean games with cards, which are described in detail in "Korean Games," the most common one is similar to the American Indian game of Straw (p. 894). Its name is *Yet-pang-mang-i*.[1]

The cards are shuffled, as is customary, by the dealer, who divides the pack into two parts. These he holds at the top in each hand, drawing the ends of the cards, which lay side by side, through each other; or, the cards are drawn out near the bottom and put upon the top.

One pack is used in this game and any number may play. The gamekeeper, *Moul-tjyou*,[2] deals a card face down to each player, including himself, always drawing the cards from the bottom instead of from the top. The players have all put down their wagers, which have been covered by corresponding amounts by the *Moul-tjyou*. The object of the game is to get two or three cards upon which the sum of the

[1] *Yet-pang-mang-i* (*yet* is a "sweetmeat," *pang-mang-i* a "pestle" or "club") is the most popular game. Sometimes the same player holds the bank for three rounds, sometimes for five. The game is a favorite with the Korean sharper, who will abstract an extra card or, if dealer, will place a *tjyang* and a *kou* (nine) where they will fall to himself.—WILKINSON.

[2] Chinese, *mat chü*, "things ruler."

numerals is nine, called *kap-o*, or nineteen, the tens not counting, and only the units being significant. In default of achieving nine, the

Fig. 219.
SUIT MARKS ON KOREAN CARDS.
From Korean Games.

lower units count, eight being considered good. Each player then draws one or two cards from the bottom of the pack.

If the *Moul-tjyou* has an excess over any player, taking the sum of

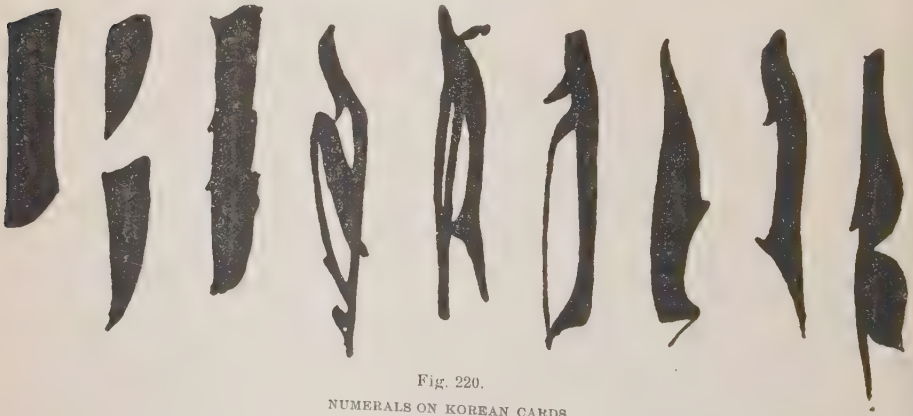
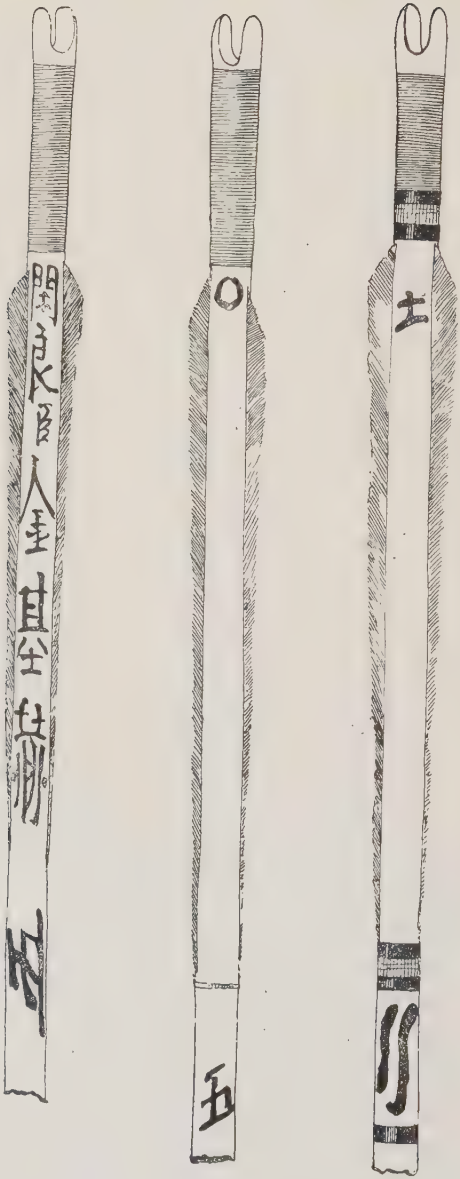


Fig. 220.
NUMERALS ON KOREAN CARDS.
From Korean Games.

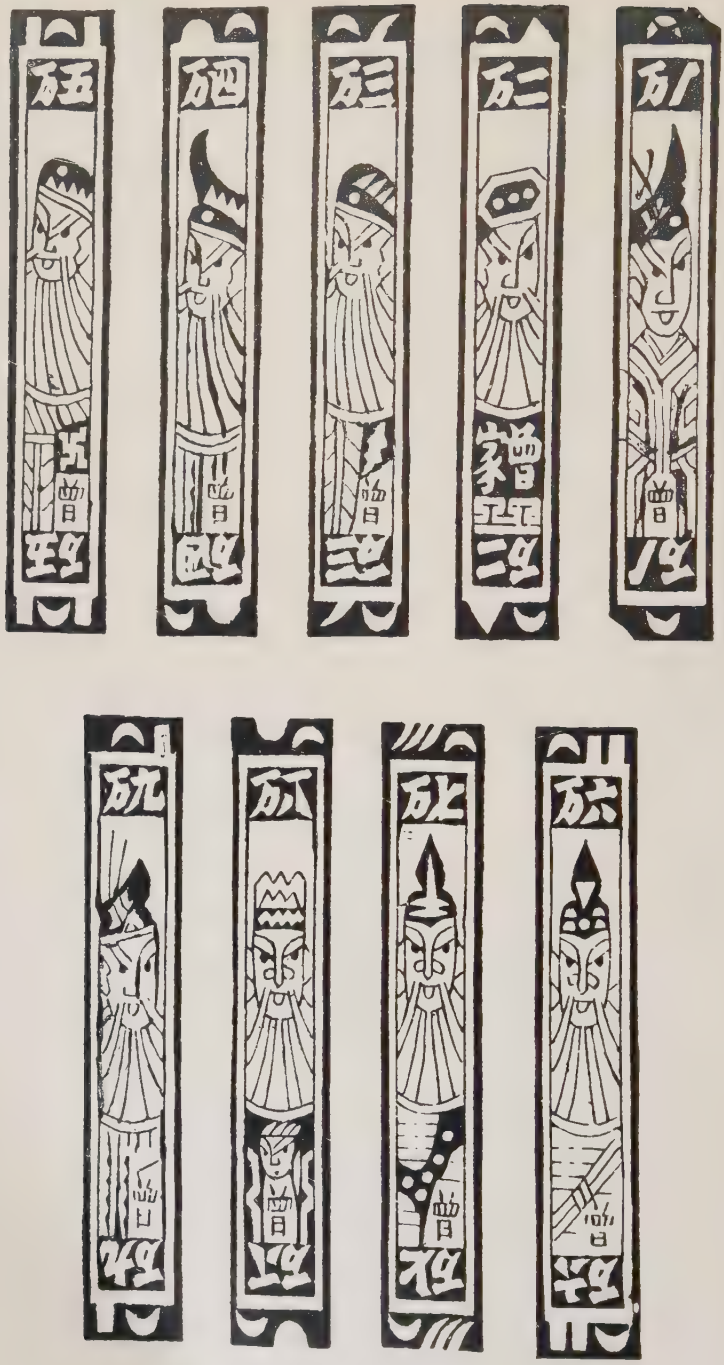
the numerals on his two or three cards, less the tens, he wins that player's stakes; but the players who count higher than the *Moul-tjyou*



SHAFTMENTS OF PRACTICE ARROWS.

Korea.

U. S. National Museum. From Korean Games.



CHINESE PLAYING-CARDS.

Showing survivals of Korean card numerals as index-marks.

Kiu Kiang.

Cat. No. 6, Wilkinson collection, Museum of Archæology, University of Pennsylvania.

each wins an amount equal to their stakes from him. When both count alike, neither wins. Three cards having the same number count higher than nine. It will be observed that in this game the suit-marks do not appear to be regarded, and it is to be inferred that the packs of forty and sixty cards, without suit-marks, are used for it.

78. PRACTICE ARROWS.[1] Korea. Three from a set of five.

The arrows used at the present day in archery (Plate 46). They are called *you-yep-tjyen* (Chinese, *lau íp tsín*), "willow-leaf arrows," and are made of bamboo, 34 inches in length. The point is of iron, nail-shaped, with a stop which fits against the fore-shaft. The latter is usually made of cherry wood, with or without the bark on, and is about $1\frac{1}{4}$ inches in length. The footing, also of cherry wood, has a cylindrical nock with a U-shaped notch. The feathers, three in number, are carefully and uniformly trimmed and are fastened with glue; on some, in a straight line, and on others, at a slight angle to the shaft. These arrows usually bear the personal name of the owner, written in Chinese characters, between the feathers. All of these arrows are numbered with Chinese characters, from one to five below the shaftment.[2]

These arrows are shown to illustrate the probable source of the Korean playing-cards, which, however, doubtless originated long before the art of writing was perfected. It will be observed that the arrows are numbered in sets of five, while the cards are in suits of tens. In the *tong-kăi*, or ceremonial quiver (No. 61), there are ten arrows, however, and the feathers on these arrows have black tips, which seem to be perpetuated in the feather-like marks on the backs of the cards.

79. PLAYING-CARDS.[3] Kiu Kiang, China.

Nine cards of the suit of *mán*, or "myriads" (Plate 47), from a set consisting of four packets of thirty cards each, and five jokers: the Five Blessings, *Fuk*, *Luk*, *Shau*, *Hí*, *Ts'oi*, "Happiness, Promotion, Long life, Posterity, and Wealth." The four packets are like those of the succeeding cards (No. 80).

It is probable that Chinese playing-cards, of which there are several kinds, take their form from the narrow Korean cards. The cards with money-symbols seem to be in the direct line of descent, if not from cards of which the Korean are survivals, at least from cards of the same character and origin. These particular cards are shown (Plate 47) to illustrate the index-marks on the ends (of common occurrence on the cards of this type), which may be survivals of the numerals on the Korean cards (fig. 220). Mr. Cushing regards these numerals as likely to have been derived from the cut cock-feathers of the original arrows. Mr. Wilkinson, on the other hand, considers them to be modifications of Chinese numerals.

[1] U. S. National Museum.

[2] Korean Games, p. xxi.

[3] Cat. No. 6, Wilkinson collection. Mus. Arch., Univ. Penn.

80. TSÉUNG-KWAN P'ÁI. Playing-Cards.[1] Kwangtung, China.

Set of one hundred and twenty cards, comprising four packs of thirty cards, each containing nine cards, from one to nine, of the suits of *ping*, *sok*, and *kún* ("cakes," "strings," and "myriads"), and three jokers: *Pák fá*, *Hung fá*, and *Lò ts'ín* ("White Flower," "Red Flower," and "Old Thousand").

Fig. 221.
HINDU PLAYING-CARD (FISH AVATAR).
Cat. No. 19135, Museum of Archæology, University of Pennsylvania.

81. HANA-GARUTA. "Flower Cards." Playing-Cards,[2] Japan.

Forty-eight cards with plain black backs, and faces bearing pictures of flowers in colors. Divided into twelve suits, which correspond with the twelve months and receive the following names:[3]

1. *Matsu*, Pine.
2. *Ume*, Plum.
3. *Sakura*, Cherry.

[1] Cat. No. 169334, U.S.N.M. Gift of Stewart Culin. These cards were purchased in a Chinese shop in Washington, D. C., and are the kind used by the Chinese laborers in the United States. It may be remarked that they are chiefly sold in this country for use as markers in the game of *Fán t'án*. Card-playing is very uncommon among the immigrants, and seldom if ever practiced except at the season of the New Year.

[2] Cat. No. 150828, U.S.N.M. Gift of Mrs. J. K. Van Rensselaer.

[3] Comprising the favorite flowers of Japan, which have been so arranged, according to their time of blooming, as to form a floral calendar. The list of flowers with their months is given by Dr. J. J. Rein. Japan, Travels and Resources, London, 1884, p. 441.

4. *Fugi*, Wisteria.
5. *Ayame*, Sweet Flag.
6. *Botan*, Peony.
7. *Hagi*, Lespedeza (Bush Clover).
8. *Susuki*, Eularia.
9. *Kiku*, Chrysanthemum.
10. *Momiji*, Maple.
11. *Ame*, Rain.
12. *Kiri*, Paullownia.

The game is played by three persons, one of whom deals seven cards to each player and seven face up on the table. The dealer then plays out a card, with which he endeavors to match one of those on the table. If

Fig. 222.
HINDU PLAYING-CARD (TORTOISE AVATAR).
Cat. No. 19135, Museum of Archæology, University of Pennsylvania.

successful, he takes up both cards and lays them aside. The points are counted, according to certain combinations of two or more cards, which a player may make either with the cards originally dealt him or with three taken up. These combinations are called *yaku* or "prizes." They are reckoned as equivalent to one or more *kwan* of twelve points. The counts are extremely numerous and complicated, and there are several varieties of the game. For a detailed account consult "Korean Games."[1]

[1] Bibliography: C. M. Belshaw, Hana Fuda, the Japanese Flower Game, more commonly known by the Japanese as Hachi-ju-hachi, or Eighty-eight, 9 pp., 8vo., Yokohama, 1892.

R. Lehmann, Gesellschaftspiele der Japaner, Pt. 1; Uta garuta, a card game (all

The name applied to cards, *caruta*, is certainly the Spanish *carta*, but the cards appear to be distinctly Japanese, and to contain a suggestion of the primitive modes of thought under which they doubtless originated.

82. GANJIFA. Playing-Cards.[1] Lucknow, India.

Set of ninety-six circular cards. Thin disks of lacquered card, $1\frac{1}{2}$ inches in diameter. Backs plain red. Faces bear suit marks on

Fig. 223.

HINDU PLAYING-CARD (*Pâraçu-Râmâ*).

Cat. No. 19135, Museum of Archæology, University of Pennsylvania.

grounds of different colors. There are eight suits (*rang*, "colors"), of twelve cards each, consisting of ten numerals and two court cards,

published), Mittheilungen d. deutschen Gesellschaft f. Natur- und Völkerkunde Ostasiens, III, Pt. 30, pp. 422–425, 4to., Yokohama, 1883.

H. Spencer Palmer, Hana-awase, with colored facsimiles of playing-cards on four plates (Transactions Asiatic Society of Japan, XIX (Pt. 3), pp. 545-564), 8vo., Yokohama, 1891.

Mrs. J. King Van Rensselaer, Playing-Cards from Japan, with plates, 3 pp. (Proceedings U. S. Nat. Mus., 1891, 8vo., Washington).

The writer is indebted for the above list to Fr. Von Wenckstern's Bibliography of the Japanese Empire, Leiden, 1895.

[1] Cat. No. 15280, Mus. Arch., Univ. Penn.

Mr. Ramachandrayya informs me that the chief place of manufacture of playing-cards in India is Kondapalle, in the Presidency of Madras.

Wazir and *Shah*. The suits, which are divided into "superior" and "inferior," *beshbur* and *kumbur*, are as follows:

SUPERIOR.	INFERIOR.
Taj, "crown."	*Chung*, "harp."
Sooféd, "white."	*Soorkh*, "red."
Shumsher, "saber."	*Burat*, "diploma."
Gholam, "slave."	*Quimash*, "merchandise."

The colors of the grounds in the same order are yellow, black, red, yellow, green, red, brown. Four additional packs of these cards in the University Museum agree with the above in number and design, varying

Fig. 224.

HINDU PLAYING-CARD (*Páraçu-Rámá*).

Cat. No. 19135, Museum of Archæology, University of Pennsylvania.

only in diameter from $1\frac{5}{16}$ to $1\frac{1}{16}$ inches, and in fineness of execution. One pack (Cat. No. 19134), apparently more ancient, is distinguished by superior finish, both in painting and lacquer. While the colors of the grounds of all these cards, with reference to the suit-marks, are practically the same, they differ in this respect from the similar pack in the Museum of the Royal Asiatic Society described by Chatto,[1] who gives a description of the game, taken from the Calcutta Magazine for 1815.

The preceding cards may be regarded Persian or Mohammedan in

[1] Facts and Speculations on the Origin and History of Playing-Cards, London, 1868, p. 35.

type. Such is not the case with the following packs in the University Museum, which bear Hindu emblems representing the ten avatars of Vishnu, from which they are known as the *dasavatara mulu*, or the Game of the Ten Incarnations.

One pack (Cat. No. 19135) consists of one hundred and twenty lacquered disks of cardboard, 4½ inches in diameter, with plain red backs, and faces painted with suit-marks on grounds of different colors. There are ten suits of twelve cards each, consisting of ten numerals and two court-cards. The court-cards bear representations of the ten avatars of Vishnu, one of the two of each suit having a single figure, and the other the same figure in a kind of temple, with two attendants (figs. 221–224). The marks of the numerals are as follows:

1. *Matsyâ*, the fish. Fish, black.
2. *Kurma*, the tortoise. Tortoise, brown.
3. *Varah*, the boar. Conch, dark green.
4. *Nara-Simha*, the man-lion. Flower,[1] blue.
5. *Vamana*, the dwarf. *Lota*,[2] blue.
6. *Pâraçu-Râmâ*. Axe, white.
7. *Râmâ-Chandra*. Arrow, red.
8. *Krishna*. Pestle, green.
9. *Buddha*. Lotus flower, yellow.
10. *Kalkinâ*, the "white horse." Sword, red.

Another pack (Cat. No. 19156) in the same museum, 3⅛ inches in diameter, corresponds in number, the emblems also referring to the ten avatars. The colors and suit marks vary somewhat in order from the preceding.

1. *Matsyâ*. Fish, red.
2. *Kurma*. Tortoise, red.
3. *Varah*. Boar, yellow.
4. *Nara-Simha*. Lion, green.
5. *Vamana*. *Lota*, green.
6. *Pâraçu-Râmâ*. Ax, brown.
7. *Râmâ-Chandra*. Bow and arrow, yellow.
8. *Krishna*. Disk,[3] brown.
9. *Buddha*. Conch, black.
10. *Kalkinâ*. Sword, black.

Another pack (Cat. No. 16585*f*), 3 inches in diameter, incomplete, agrees with the preceding.

Another pack (Cat. No. 16585*b*), 3 inches in diameter, also incomplete, apparently has eight suits, of which the first, third, fifth, sixth, eighth, and ninth agree with the preceding. In addition there is a green suit on which the marks are small yellow rectangles bearing the legend *sríga*.

[1] My informant, Mr. P. Ramachandrayya, of Guntur, India, was unable to identify this emblem. It resembles a flower, but may be a mace.

[2] Water vessel.

[3] My informant was unable to identify this emblem, a yellowish disk with a red dot in the center.

Another pack (Cat. No. 16585*c*), $3\frac{3}{16}$ inches in diameter, incomplete, has six suits: first, third, fifth, seventh, eighth, and ninth, agreeing with Cat. No. 19156.

Two other packs (Cat. No. 16585*a*), $2\frac{3}{4}$ inches, and (Cat. No. 16585*d*), $3\frac{3}{16}$ inches in diameter, both incomplete, each has four suits with the following marks:

Ax, red.
Trident, yellow.
Rectangle,[1] green.
Mace, black.

The court cards are missing.

From the comparison of these packs it would appear that as in the *Ganjifa* variations occur in the colors associated with certain suit marks,

Fig. 225.

HINDU PLAYING-CARD (*Buddha*).

Cat. No. 19735, Museum of Archæology, University of Pennsylvania.

and, also, as in the case of the Korean cards *Htou-tjyen* (No. 77), that there has been a progressive diminution of the suits; in this case from ten to four. Changes and substitutions are also seen to have occurred in the suit marks.

The opinion was expressed by Mr. Ramachandrayya that the Hindu cards, not being mentioned in the early records, were probably imitated

[1] In one pack (Cat. No. 16585*a*), this inscribed *srí*.

from those of Europe. The writer believes that it is more likely that their origin rests directly upon older Asiatic traditions.[1]

83. GANJÎFEH. Playing-Cards.[2] Persia.

Fifty-seven cards of a set of sixty. Card-pieces about $2\frac{1}{2}$ by $1\frac{3}{4}$ inches, consisting of thick lacquered cardboard with black backs. The faces bear pictures painted in colors upon gold-foil, the grounds being of five different colors. These are as follows:

Black: Lion devouring serpent; lion devouring ox; lions and serpent. Three varieties.
Green: Youth (King) seated. Three varieties.
Yellow: Woman (Queen). Five varieties, in four of which the woman is accompanied by a child.
Gold: Youth; hunter Three varieties.
Red: Dancing-girls. Three varieties.

A pack of Persian playing-cards in the possession of Mrs. C. C. Curtis, of Albion, New York, are identical with the preceding in size and material, but bear somewhat different designs. They number twenty cards, of five different colors, black, yellow (white), red, gold, and green, four of each. There are two cards of each kind, making ten different cards.

Black: Two lions devouring two serpents; lion devouring antelope (Plate 48*a*, *b*.)
Yellow: King on throne; mother (Madonna?) with child. (Plate 48*c*, *d*.)
Red: Lady with child; girl with wineglass and bottle. (Plate 49*a*, *b*)
Gold: Two soldiers; lad with dog. (Plate 49*c*, *d*.)
Green: Dancing-girls; queen on throne. (Plate 50*a*, *b*.)

The first-mentioned cards of each pair agree with those described below by General Schindler. It will be observed that the uniform of the soldiers, that of the English East India Company, precludes the possibility of any high antiquity for these particular cards.[3]

Gen. A. Houtum Schindler, of Teheran, in reply to a letter of inquiry addressed by the writer, has forwarded the following account of Persian cards:

The old Persian name for these cards was *ganjîfeh*—a word, I think, derived from the Chinese (*chi-p'ái*—literally, paper-cards, the modern Chinese for playing-cards), with the Persian word *ganj* = "treasure" prefixed. It may have also been originally *Kan-chu-p'ái* = cards from Kanchu, in the Kansu province. The word *ganjîfeh* is in Persian now only employed for European playing-cards (four suits, ace to ten; three picture cards each suit), which, however, are also called *varak*, while the old Persian playing-cards are known as *varak i âs—varak i âsanâs*—or simply *âs*, from the game *âs* or *âsanâs*, which is played with them. From travelers in Persia in the sev-

[1] As an analogue to the rectangular, arrow-derived cards of Eastern Asia may be found in the playing-sticks of the northwest coast of America, so the wooden gambling-disks of the same Indians may be taken as possible American equivalents of the circular cards of India.

[2] Cat. No. 18258, Mus. Arch., Univ. Penn.

[3] Six Persian cards similar to those described are figured by Mrs. J. K. Van Rensselaer, in The Devil's Picture Books, London, 1892.

a

b

c

d

PLAYING-CARDS (*ganjifeh*).

Length, 2⅜ inches; width, 1¾ inches.

Persia.

In the possession of Mrs. C. C. Curtis, Albion, New York.

a

b

c

d

PLAYING-CARDS (*ganjifeh*).

Persia.

In the possession of Mrs. C. C. Curtis, Albion, New York.

a

b

PLAYING-CARDS (*ganjifeh*).

Persia.

In the possession of Mrs. C. C. Curtis, Albion, New York.

enteenth century we know that a set of *ganjîfeh* consisted of ninety or ninety-six cards in eight suits or colors. At present a set consists of twenty cards in five colors or values. These values are:

1. *Shîr va Khurshîd* or *âs:* Lion and Sun, or Ace.
2. *Shâh* or *Pâdishâ:* King.
3. *Bîbî:* Lady (or Queen).
4. *Sarbâz:* Soldier (or Knave).
5. *Lakat* (meaning something of little value): generally a dancing-girl.

The backs of the cards are always black or of a dark color, but their faces have grounds of different colors, viz: The Lion and Sun, a black ground; the King, a white ground; the Lady, red; the soldier, gold; the *Lakat*, green. The pictures on the cards show much variety and are often obscene, particularly those on the card of the lowest value. The ordinary types as now made are: Ace, a Lion and Sun, as in the Persian arms; a King sitting on a throne; a European lady in a quaint costume; a Persian soldier shouldering his rifle; a Persian dancing-girl. The word *ganjîfeh* I have explained. *Âs* is no doubt our word "ace," probably introduced into India through the Portuguese Neither of the words is found in Persian dictionaries. The game of *Âs* is exactly like Poker, but without any flushes or sequences. There are four players, and each player gets five cards, dealt to the right. The dealer puts down a stake. The first player then looks at his cards. If he "goes," he says *dîdam* (I have seen), and covers the stake or raises it. If he does not wish to play, he says *nadîdam* (I have not seen) and throws his cards. He may also "go" without looking at his cards—that is, in poker parlance, "straddle"—and he says *nadîd dîdam* (not seeing, I have seen). The second player, if he wishes to play, must cover the stakes, and can also raise. The third player and the dealer then act in the same way just as in poker, and when the stakes of all players are equal and no one raises any more the cards are turned up and the player holding the best hand wins the stakes.

The hands in the order of their value are as follows:

Seh va just, i. e., three and a pair; a "full."
Sehta, i. e., threes, aces, kings, etc.
Do just, i. e., two pairs; aces highest.
Just, i. e., one pair; aces highest.

When two players have the same pair or pairs, the other cards decide; for instance, a pair of kings, ace, soldier, and *lakat*.

"Bluffing" is a feature of the game and is called *tûp zadan;* literally, "fire off a gun." A bluff is *tûp*.

84. PLAYING-CARDS.[1] Siam. Nineteenth century.

Pack of eighty cards, painted in colors on black cardboard, 1½ by 2½ inches. One suit of ten cards eight times repeated, comprising numeral-cards with conventional flowers as suit-marks; from two to eight cards with pictures of fish; eight cards with picture of man in native dress, and eight with grotesque picture of man with sword.

85. TAROCCHI. Playing-Cards[2] (Venetian Tarots). Milan, Italy. Nineteenth century.

Seventy-eight cards, comprising twenty-two *attuti* and fifty-six numerals. The suit-marks of the numeral series are *Coppe*, *Danari*, *Spade*, and *Bastoni;* "Cups," "Money," "Swords," and "Clubs." The court-

[1] Cat. No. 16528, Mus Arch., Univ. Penn.
[2] Cat. No. 15645, Mus. Arch., Univ. Penn.

cards are designated as *Re*, *Regina*, *Cavallo*, and *Fante*. The *attuti* are numbered and bear the following names:

I. Il Bagattella.	IX. L' Eremita.	XVII. Le Stelle.
II. La Papessa.	X. Rout. Dellafor.	XVIII. La Luna.
III L' Imperatrice.	XI. La Forza.	XIX. Il Sole.
IV. L' Imperatore.	XII. L' Appeso.	XX. Il Giudizio.
V. Il Papa.	XIII.	XXI. Il Mondo
VI. Gli Amanti.	XIV. La Temperan.	Il Matto
VII. Il Carro.	XV. Il Diavolo.	
VIII. La Giustizia.	XVI. La Torre.	

The thirteenth card with the picture of "death" bears no name,[1] and the *matto* is not numbered.

The origin of European playing-cards is extremely obscure. They are variously regarded as having been invented in Europe, and to have been introduced from the East. Willshire[2] favors the former view, and assigns the earliest European cards to Italy, while others believe them to have been derived from China, or to have been introduced by the Arabs or Gypsies.[3]

There are two principal kinds of European cards; one consisting of from thirty-two to fifty-six cards, comprised in four suits, each composed of a series of numeral cards and court or coate-cards, or honours; and another, called *Tarots* (France) or *Tarocchi* (Italy), in which the preceding pack is supplemented with twenty-two or more cards called *atouts* (France) or *atutti* (Italy), bearing emblematic devices of a mythological or historic character. The earliest, or what are believed to be the earliest, Italian cards are of the latter kind.

There are three varieties of Italian *Tarots*, according to Willshire: the *Tarots* of Venice or Lombardy, regarded by him as the parent game; the *Minchiate* of Florence, and the *Tarocchino* of Bologna.

The source of the allegorical designs on the cards of the emblematic sequence has been referred to a series of early Italian prints bearing full-length figures illustrating the various conditions of life—the Muses, Arts, Sciences, etc.—which are regarded as having been intended for purposes of instruction rather than for play. These prints, known as the *Tarocchi di Mantegna* or the *Carte di Baldini*, exist in several European collections, and are fifty in number, arranged in five series, consecutively numbered (No. 86). Mr. W. H. Wilkinson, in a paper on the Chinese Origin of Playing-Cards,[4] in which he presents a strong

[1] In a similar pack from Piacenza (Gius Beghi), the thirteenth card is labeled *Lo Specchio*.

[2] A Descriptive Catalogue of Playing and Other Cards in the British Museum, 1876.

[3] For a discussion of the relations of European and Oriental playing-cards see: Karl Himly, Morgenländisch oder abendländisch? Forschungen nach gewissen Spielausdrücken, Zeitschrift d. deutschen morgenländischen Gesellschaft, XLIII, pp 415, 555. For a list of books on playing-cards, consult A Bibliography of Card-Games and of the History of Playing-Cards, compiled by Norton T. Horr, Cleveland, Ohio, 1892.

[4] American Anthropologist, January, 1895.

argument in favor of the Chinese origin of European cards, regards the Italian *Tarot* pack as a suggestive compound of the two national card games of China; *Kon ú*, played with *Kwan p'ái* (No. 80), and *T'ín kau*, played with dominoes (No. 21), or domino-cards (No. 22). In the light thrown by the study of Korean cards upon the origin of playing-cards in Asia, the present writer believes that while it is more than probable European playing-cards had an identical origin with those of China, it is not yet apparent that there was any actual transference of cards or card-games. In his opinion it may be concluded that the four suits of European cards were originally the emblems of the Four Directions.

86. Tarocchi di Mantegna. *Misero* (I); *Marte* (Mars) (XLV). Reproductions[1] of originals in the British Museum. From Willshire.

The first is regarded by some as the source of the design on the *Matto* or *Fou* of the *Tarot* series, and the second that of *Il Carro* (VII). The resemblance between the emblems testifies either to a descent of both compositions from an antecedent or common type, or that the piece No. 7 of the old Venetian *Tarots* is simply a modification of No. 45 of the Italian sequence (Willshire).

87. Minchiate. Playing-Cards.[2] Florence, Italy. Nineteenth century.

Pack of ninety-seven cards, comprising fifty-six numeral-cards and forty-one *atutti*. The former are similar to those of the preceding pack (No. 85). The *atutti* from I to XXV are numbered.

Willshire describes the characteristics of the Florentine *Minchiate* as follows:

> In place of the twenty-two *atutti* of the old Venetian sequence there are forty-one *tarots* proper, i. e., nineteen of the older series, or what are equivalent to them, and twenty-two additional *tarots*, including the *Matto* or *Fou*. The chief modifications of the old Venetian sequence are: the figure of *Le Pape* (No. V) is withdrawn; *La Papesse* (No. II) becomes *Le Grand Duc; L'Impératrise* (No. III) and *L'Empereur* (No. IV) represent the "Emperor of the West" and the "Emperor of the East" respectively; *L'Hermite* (No. IX) becomes an old man upon crutches (*Le Sablier* No. XI), having behind him a star and above his shoulders an hourglass transfixed by an arrow; while *La Maison Dieu ou la Foudre* (No. XVI) is discarded, or is perhaps metamorphosed into *L'Enfer* (No. XV), *L'Etoile* (No. XVII), *La Lune* (No. XVIII), *Le Soleil* (No. XIX), and *Le Monde* (No. XXI) are retained. To this slight modification of the old Venetian *Tarots* are added the three theological virtues, Faith (No. XVIII), Hope (No. XVI), and Charity (No. XIX). Other additional pieces are: One of the four cardinal virtues, Prudence (No. XVII); the four elements of the ancient philosophers, as Fire (No. XX), Water (No. XXI), Earth (No. XXII), Air (No. XXIII); the twelve signs of the Zodiac (Nos. XXIV to XXXV); the remainder of the series concluding with the Star, the Moon, the Sun, the World, and *La Renommée*.

Willshire states that there is a tradition that *Minchiate* was invented by Michael Angelo to teach children arithmetic.

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[1] Lent by Stewart Culin.

[2] Cat. No. 15641, Mus. Arch., Univ. Penn.

88. TAROCCHINO. Playing-Cards.[1] Bologna,[2] Italy. Nineteenth century.

Pack of sixty-six cards, comprising forty numeral-cards and twenty-two *atutti*. The numeral-cards are like those of the preceding packs, except that they are double-headed, instead of having full-length figures, and in that the twos, threes, fours, and fives are suppressed, the latter being the chief characteristic of the *Tarocchino*. The *atutti* bear designs copied from a Florentine *Minchiate* set.

According to Willshire, this modification of the *Tarot* game was invented at Bologna, early in the fifteenth century, by Francesco Fibbia (Prince of Pisa), an exile in that city, dying there in 1419. The word *tarocchino* is a diminutive of *tarocchi*, a name early applied to any game with *Tarots*.

89. TAROTS. Playing-Cards.[3] French.[4] Claude Burdel, 1751.

Pack of combined *Tarots;* that is, twenty-two *atouts* and fifty-six numerals. The suits of the numeral series have the old marks: *Coupes*, *Deniers*, *Bastons*, and *Epées*—"Cups," "Money," "Clubs," and "Swords." The court-cards are designated as *Roy*, *Reyne*, *Cavalier*, and *Valet*. The *atouts* are numbered and bear the following names:

I. Le Batelevr.
II. La Papesse.
III. L'Impératrise.
IV. L'Emperevr.
V. Le Pape.
VI. L'amovrevx.
VII. Lecharior.
VIII. Iustice.
IV. Lermite.
X. La Rove de Fortvne.
XI. La Force.
XII. Le Pendv.
XIII.
XIV. Tenperance.
XV. Le Diable.
XVI. La Maison Diev.
XVII. Lestoille.
XVIII. La Lvne.
XIX. Le Soleil.
XX. Le Ivgement.
XXI. Le Monde.
Le Mat.

The thirteenth card with the picture of death bears no name, and the twenty-second, the *mat*, is not numbered. It will be observed that the suit-marks are similar to those of Italy, this being almost uniformly the case with *Tarot* packs.

90. TAROK-KARTEN.[5] Playing-Cards. Tarots. Frankfurt-am-Main.[6] Germany. Nineteenth century.

Pack of seventy-eight cards, comprising fifty-six numerals and twenty-two *atouts*. The numerals bear French suit-marks, and the court-cards pictures of historical personages. The King of Diamonds is Charles I; the Queen, Elizabeth; the Knight, Marlborough, and the Knave, Shakespeare. The Hearts bear French portraits; the Spades, Russian, and the Clubs, German. The *atouts* are numbered from I to XXI, and are ornamented with pictures referring to the four nations: England, France, Germany, and Russia.

[1] Cat. No. 15555, Mus. Arch., Univ. Penn.
[2] Emilia Angiolini.
[3] Lent by Stewart Culin.
[4] Probably made in Switzerland. A similar pack of French *Tarots* in the University Museum (Cat. No. 19316) is inscribed "Jacque Burdel Cartier a Fribourg en Suisse, 1813."
[5] Cat. No. 15716, Mus. Arch., Univ. Penn.
[6] B. Dondorf.

German *Tarot* packs, called *Tarok*, vary greatly in their ornamental and symbolic designs from the Italian cards from which they are manifestly copied.

91. Jeu des 78 Tarots Égyptiens.[1] Paris,[2] France. Nineteenth century.

Set of seventy-eight numbered cards, intended for fortune-telling, with designs copied from the *Tarot* pack. Accompanied by a handbook, entitled Art de Tirer les Cartes.

The use of cards for the purpose of fortune-telling is well known. Indeed, it is the opinion of some authorities that cards were introduced into Europe for the purpose of divination and fortune-telling, by the Gypsies, some time between 1275 and 1325. There is evidence that cards were used for this purpose early in the sixteenth century. According to Willshire, recourse to cards for divinatory purposes gradually declined among the upper classes until the middle of the eighteenth century, though it prevailed, no doubt, among the lowest grades of society frequenting fairs and the caravans of mountebanks. In 1750, divination with cards again became popular, and at this period, in 1753, a perruquier, named Alliette, who reversed the letters of his name, and called himself Etteilla, superseded the ordinary practice of employing the cards of the pack singly, and substituted the art of reading the mysteries they might unfold when the whole sequence was arranged upon a table.

The emblematic figures of the Tarot pack have been the object of much speculation, and their origin is said to extend back to the ancient Egyptians, from whom they have descended to us as a book or series of subjects of deep symbolic meaning. The discovery and explication of this supposed source and hidden meaning of the Tarots employed in modern times was claimed by M. Court de Gebelin in 1781. He asserts that the series of seventy-eight Venetian Tarots has an unquestionable claim to be regarded as an Egyptian book, and that it is based upon the sacred Egyptian number seven. Alliette applied the theories of M. de Gebelin to the use of cards in fortune-telling, and numerous packs are made even at the present day to be used in accordance with the system which he formulated.

92. Carte da Giuocare. Playing-Cards.[3] Bologna,[4] Italy. Nineteenth century.

Forty cards of four suits: *Coppe*, *Danari*, *Spade*, and *Bastoni;* the court cards, *Re*, *Regina*, and *Fante;* the numerals, ace to seven, the eights, nines, and tens being suppressed, agreeing with the pack used in the Spanish game of *El Hombre.*

The above may be regarded as a characteristic Italian pack. A distinctive character of the marks of the numerals in the suits of *Spade*

[1] Cat. No. 9010, Mus. Arch., Univ. Penn.
[2] J. Lismon.
[3] Cat. No. 15594, Mus. Arch., Univ. Penn.
[4] Pietro Barigazzi.

and *Bastoni* is the mode in which they are interlaced or connected together in place of standing separately or apart. The curved forms, too, of the *Spade*, or swords, are specially Italian in design. The designs on cards vary in different parts of Italy. Thus in the south, cards with Spanish marks are used, while the Florentine pack bears French suit-marks. Cards are made at the present day in many of the Italian cities. Each maker supplies not only those of the local type, but usually those of other cities. Stencils are still used for some of the cheaper cards.[1]

93. CARTE DA GIUOCARE. Playing-Cards.[2] Naples,[3] Italy.

Forty cards of four suits like the preceding, except that the suit-marks are similar to those on Spanish cards.

94. CARTE DA GIUOCARE. Playing-Cards.[4] Florence,[5] Italy.

Forty cards of four suits like the preceding, except that the cards bear French suit-marks. Designated as *Carte Romane.*

95. TRAPPOLA CARDS.[6] Austria. Nineteenth century.

Thirty-six cards of four suits, agreeing with the Italian, except that the *danari* are replaced with conventional flowers. The three, four, five, and six of numerals are suppressed. The court-cards are *Re*, *Cavallo*, and *Fante*. These cards are remarkable for their length, being $5\frac{5}{16}$ by $2\frac{5}{16}$ inches.

According to Willshire, there are no marks special to *Trappola*, it being played with a series of numerals, of which the three, four, five, and six of each suit are suppressed, and as long as this is done it may be played with cards showing no matter what marks of suits. From the circumstances of its being a Venetian game, the original marks of the suits were naturally the Italian ones.[7]

96. HISPANO-AMERICAN CARDS. Reproductions[8] of originals in the Archives of the Indies. Seville, Spain.

(*a*) Facsimile in color of an uncut sheet, 11 by 17 inches, with wood-block impression of twenty-four cards colored in red, blue, and black, 2 by $3\frac{1}{2}$ inches. They represent the court cards of the suits of *Copas*, *Oros*, *Espadas*, and *Bastos*, and ten numeral or pip-cards of the suit of swords. There are but three court-cards for each suit instead of four,

[1] The following list of Italian card games is given by Mr. W. W. Story (Roba di Roma, I, p. 160): *Briscolla, Tresette, Calabresella, Banco-Fallito, Rossa e Nera, Scaraccoccia, Scopa, Spizzica, Faraone, Zecchinetto, Mercante in Fiera, La Bazzica, Ruba-Monte, Uomo-Nero*, and *La Paura*. Descriptions follow of *Zecchinetto, Briscola, Tresette*, and *Calabresella*.

[2] Cat. No. 15563, Mus. Arch., Univ. Penn.

[3] Vincenzo Russo.

[4] Cat. No. 15603, Mus. Arch., Univ. Penn.

[5] Antonio Poli.

[6] Cat. No. 15738, Mus. Arch., Univ. Penn.

[7] Similar cards to those exhibited are used at the present day in Silesia.

[8] Made for the author in Madrid through the courtesy of the late Señor Don Justo Zaragossa.

as in the present Spanish pack. The marks of the numeral suit consist of crossed swords instead of being arranged as on the current Spanish cards. The back of this sheet bears an inscription in pen and ink: *Nueva Espana, 1583. Archivo de Indias, No. 117. Dibujo.*

(*b*) Photograph of uncut sheet of the same size, imprinted with designs for the backs of eighteen cards. The devices are all different, and embrace a mixture of Mexican and European subjects, including the Emperor Montezuma (fig. 226), his successor, Quahtemotzin, native priests performing various rites, and grotesque figures, apparently of the school of Albert Dürer.[1]

Fig. 226.

REVERSE OF HISPANO-AMERICAN PLAYING-CARD.

(The Emperor Montezuma.)

Impression, 2⅞ by 4 inches.

Mexico, 1583.

From photograph of original in Archives of the Indies, Seville, Spain.

Playing-cards, early introduced by the conquerors, were known to the ancient Mexicans under the *amapatolli*.[2]

97. NAIPES. Playing-Cards.[3] Cadiz, Spain. Nineteenth Century.

Forty-eight cards of four suits, *Copas*, *Oros*, *Espadas*, and *Bastos*: "Cups," "Money," "Swords," and "Clubs." The court cards are *Rey*, *Caballo*, and *Sota*: "King," "Knight," and "Knave." This is the legitimate Spanish pack, the tens, as is customary, being suppressed.

According to Willshire, no remains of very old Spanish cards have reached our time. The Hispano-American cards in the Archives of the Indies at Seville (No. 96) are probably the oldest Spanish cards in existence. Spanish cards are characterized by certain pecularities evinced by actual examples and historical allusions. Spanish *Tarots* are unknown, and it is doubtful if such ever existed. All Spanish packs are of the numeral kind. In a legitimate Spanish pack there are only forty-eight cards instead of fifty-two. There is no Queen among the

[1] The early publication of these card-sheets with explanatory notes is intended by the writer.

[2] Compounded of *amatl*, "paper," with *patolli*, a general word for a game of any kind, derived from *patoa*, "to play a game" (D. G. Brinton). Again we have *quauh patolli*, "wood game" = chess.

[3] Cat. No. 167574, U.S.N.M. Gift of Dr. G. Brown Goode.

honors, her place being supplied by a *Caballero* or *Caballo*. The marks are similar to those of Italy, but the Spanish designs differ from the former, as do the figures on the coat-cards. While the Italian kings are seated, the Spanish kings are erect, and their vast mantles are surcharged with large ornaments, as in the case of the French kings. The swords are straight, double-edged rapiers; the batons, knotty branches of trees, and these knotty branches are placed sometimes horizontally, sometimes vertically, close to each other, but always so arranged that they are never interlaced in the manner common to the numeral-cards of the Italian *Tarots*.

98. NAIPES Playing-Cards.[1] Cadiz, Spain. Nineteenth Century. Purchased in Peru.

Pack of forty cards similar to preceding, except that eights, nines, and tens are suppressed. Such a pack was used for the Spanish game of *El Hombre* or *Ombre*.

99. PLAYING-CARDS.[2] Apache Indians. United States.

Pack of forty cards painted with native colors upon tanned hide. Four suits of ten cards each, directly copied from the Spanish cards, No. 98, but with the designs of the suit-marks and court-cards modified to accord with native ideas.

Capt. John G. Bourke informed me that the Apache have borrowed many of the words relating to playing-cards, as well as the cards themselves, from the Mexicans. The four suits they call *Copas*, *Escudos*, *Espadas*, and *Bastones* or *Palos*. The names of *Rey* and *Sota* are the same as in Spanish, but the *Caballo* is *Jliv* or "Horse." The Ace they call *As*, but for the other numerals native names are used: *Naqui*, 2; *Taqui*, 3; *Tingui*, 4; *Irosh klay*, 5; *Custan*, 6; *Cusetti*, 7. "Shuffle" is *jli-ka-shi-ache*. Captain Bourke says: "I think this means 'I take or hunt for the horse *Caballo:*' *Jli* or *jliv* = horse; *ka*, abbreviation for *daka* = card; *shi* = I, and *achi* = wish, take, hunt." Cut is *da-na*, and cards, *daka* (*carta*). Their game they call *Con-quien*, "with whom?" It is also known by the native name of *Daka-cunitsnun* = "Cards ten." The *Rey* or King is also called *Inju* or *Inshu* = "Good."

100. PLAYING-CARDS. Celebes.[3] Nineteenth century.

Pack of forty cards painted in red, yellow, green, and black on white cardboard, with red backs. Four suits of ten cards, with the numerals eight, nine, and ten suppressed. Degenerate European cards, corresponding with the Spanish pack, No. 98, from which they appear to have been derived.

101. CARTES À JOUER. Playing-Cards.[4] Piquet pack. Paris, France. Nineteenth century.

Thirty-two cards. Suits: *Carreaux*, *Cœurs*, *Piques*, and *Trefles*.

[1] Cat. No. 7111, Mus. Arch., Univ. Penn.

[2] Cat. No. 10490, U.S.N.M.

[3] Cat. No. 154088, U.S.N.M. Collected by Mr. Victor Janny, United States Consular Agent.

[4] Cat. No. 7594, Mus. Arch., Univ. Penn.

The kings bear the names of Cæsar, Charles, David, and Alexander; the queens, Rachel, Judith, Pallas, and Argine; and the knaves, Lahire, Hector, Hogier, and Lancelot.

The earliest French cards known are said to be those in the Carpentier collection. These cards are fourteen in number, painted by hand about the commencement of the fifteenth century. They bear the same suit-marks as the French cards of the present day. These marks were so persistently maintained and introduced on cards exported to all countries that a regular type or class of cards became known as French cards, as opposed to Italian cards on the one hand and to German cards on the other.

At first the figure-cards or honors were without names on them, but about the last quarter of the sixteenth century names were attached. French playing-cards having on them the suit-marks, *Cœurs*, *Carreaux*, *Trefles*, and *Piques*, are often termed *Piquet* packs. The game of *Piquet* is one in which, up to the beginning of the eighteenth century, the pack consisted of thirty-six cards, the two, three, four, and five of each suit being suppressed, as in *Trappola* and the *Tarocchino* of Bologna. From the date mentioned the six of each suit has been omitted, so the *Piquet* pack has now but thirty-two cards.

102. SPIEL-KARTEN. Playing-Cards.[1] Frankfort-on-the-Main,[2] Germany. Nineteenth century.

Pack of thirty-six cards of four suits: *Herzen*, *Laub*, *Eicheln*, and *Schellen*, or "Hearts," "Leaves," "Acorns," and "Bells." The numerals are ace, six, seven, eight, nine, and ten, the suppression of the two, three, four, and five being a peculiarity of the true German pack. The court-cards are the *König*, "King," and the *Obermann* and *Untermann*, superior and inferior valets.

Willshire states that, according to trustworthy authorities, allusion is made to playing-cards in the *Pflichtbücher* of Nürnberg for 1384, and there is extant an ordinance of the town council of Ulm for the year 1397 prohibiting their employment. "It is probable," he says, "that the Germans very soon altered for themselves the Italian marks of the suits, making use of figures of animals for differentiating the latter." The earliest German cards known have dogs, falcons, stags, and ducks for suit-marks. These "animated" cards were, however, soon followed by a series having the more national signs of *Roth* or *Herzen*, *Laub* or *Grün*, *Eicheln*, and *Schellen*, or Hearts, Leaves, Acorns, and Bells.

103. SPIEL-KARTEN. Playing-Cards.[3] Leipsic, Germany. "La Belle Alliance."

Pack of thirty-six cards with German suit-marks, like the preceding. Numerals bear colored pictures of the battle of Leipsic, 1813; the Kings, portraits of the allied sovereigns, and the other court-cards, generals.

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[1] Cat. No. 15712, Mus. Arch., Univ. Penn.

[2] B. Dondorf.

[3] Cat. No. 17826, Mus. Arch., Univ. Penn. Collected by Col. Joseph G. Rosengarten.

104. SPIEL-KARTEN. Playing-Cards.[1] Vienna,[2] Austria.

Pack of thirty-two cards with German suit-marks. Court-cards bear pictures of the heroes of the story of William Tell; the Aces emblematic pictures of the four seasons. Designated as *Schweizer Deutsche.*

105. SPIEL-KARTEN. Playing-Cards.[3] "Swiss cards." Schaffhausen, Switzerland. Nineteenth century.

Pack of thirty-six cards bearing as suit-marks, Bells (*schellen*), Flowers (*blume*), Shields (*schildchen*), and Acorns (*eicheln*). The numerals comprise the Ace, Two, Six, Seven, Eight, and Nine; the court-cards, *Konig*, *Ober*, and *Unter*.

Willshire states that the old cards of Switzerland were evidently derived from Germany. The numeral cards of Schaffhausen are as above, while they run from 1 to 9 in those of Soleur.

106. SPIEL-KARTEN. Playing-Cards.[4] Swiss views and costumes. Schaffhausen,[5] Switzerland. Nineteenth century.

Whist pack of fifty-two cards with French suit-marks. The backs of the cards and the Aces bear pictures of Swiss scenery, and the court-cards Swiss peasants in the costume of different Cantons.

107. SPILLE-KORT. Playing-Cards.[6] Denmark.[7] Nineteenth century.

Whist pack of fifty-two cards with French suit-marks.

108. KILLE-KORT. Playing-Cards.[8] Swedish.[9] Nineteenth century.

Pack of forty-two cards, printed in black on lavender-colored cardboard, comprising two each of a numerical series from one to twelve, marked with fleur-de-lis, and two each of the following picture cards:

Blären, fool.
Arelquin, harlequin.
Pottan, flower pot.
Krans, wreath.
Wardshus, inn.
Husu, boar.
Cavall, knight (horseman).
Husar, hussar.
Cucu, cuckoo.

The name of the game, *Kille*, is applied to the harlequin. According to the work cited below, this game is known in Sweden by the name of *Cambio*, "exchange."

A corresponding modern Danish game called *Gnavspil*,[10] in the

[1] Cat. No. 15686, Mus. Arch., Univ. Penn.
[2] Josef Glanz.
[3] Cat. No. 17823, Mus. Arch., Univ. Penn.
[4] Cat. No. 15726, Mus. Arch., Univ. Penn.
[5] Jean Müller.
[6] Cat. No. 7598, Mus. Arch., Univ. Penn.
[7] L. P. Holmblad, Kjöbenhavn.
[8] Cat. No. 16576, Mus. Arch., Univ. Penn.
[9] These cards, purchased in Chicago, bear the legend "Chicago" on the wrapper, and were probably made in the United States.
[10] S. Salomon & Co., Copenhagen.

University Museum,[1] consists of forty-two cards lithographed in colors, comprising two each of a numerical series, from zero to twelve, and two each of the following picture-cards:

Narren, fool.
Uglen, owl.
Potten, vase.
Huset, house.
Katten, cat.
Hesten, horse.
Dragonen, dragoon.
Gjegen, cuckoo.

109. CUCU CARDS.[2] Bari,[3] Italy.

Pack of forty cards, printed in colors, comprising two each of a numerical series from one to ten, in black, and two each of the following picture-cards:

Matto, fool
00. *Mascherone*, gorgon.
000. *Secchia*, bucket.
0000. *Nulla*, nothing.
XI. *Taverna*, inn.
XII. *Gnaf*, cat.
XIII. *Salto*, horse.
XIV. *Tuffo*, bravo.
XV. *Cucu*, cuckoo.

and a card with a rampant lion holding a shield inscribed *dilettevole giuoco dell chuchu*.

A corresponding modern *Cucu* pack from Bologna,[4] in the same Museum,[5] is printed in colors, but with older and ruder designs, and is similar to the preceding, except that the numbered cards have Roman numerals and bear rude colored pictures of Italian cities, among which Pisa may be recognized by its leaning tower.

110. HEXEN-KARTEN ("Witch Cards").[6] Germany.

Pack of thirty-two, printed in colors, comprising twelve cards, with Roman numerals from I to XII, printed in red, and two each of the following picture-cards:

LEGEND.	DEVICE.
Nar,	Fool.
Hex,	Witch.
Glass,	Glass.
Däller,	Plate.
Würst,	Sausage.
Einkert (come in), *Auszahlt* (pay up),	Inn.
Miau,	Cat.
Hott,	Horse.
Werda,	Sentry.
Pfeift,	Parrot.

[1] Cat. No. 19157.
[2] Cat. No. 15528, Mus. Arch., Univ. Penn.
[3] Guglielmo Murari.
[4] Pietro Marchesini.
[5] Cat. No. 15751.
[6] Cat. No. 15735, Mus. Arch., Univ. Penn.

The pictures on each pair of cards differ in details from each other.

A similar pack of *Hexen-karten* in the University Museum,[1] probably made in Nürnberg in the seventeenth or early in the eighteenth century, consists of thirty-two cards printed in colors, comprising twelve cards with Roman numerals, printed in black, from I to XII, and two each of the following cards:

LEGEND.	DEVICE.
Narr,	Fool.
Hex (hexe),	Witch.
Glass,	Glass.
Döller,	Plate.
Würst,	Sausage.
Einkert (come in), *Ausalt* (pay up),	Inn.
Miau,	Cat.
Hott,	Horse.
Werda,	Sentry.
Pfeift,	Parrot.

The numeral cards are inscribed at the top *nûmero*, and below the number are pictures of cities, which, upon comparison, prove to be highly conventionalized copies of the pictures of Italian cities on the cards from Bologna. A very complete account of this game is given by K. A. Bierdimpfl,[2] who states that in Germany the game has different names, that of *Hexen* or "witch" cards being the local name in old Bavaria. The game exists in France under the name of *Coucou.*

The following table illustrates the interrelation of the preceding Italian, German, Swedish, and Danish packs:

	Italy.	*Germany.*	*Sweden.*	*Denmark.*
	Cucu.	Hexen-Karte.	Kille Kort.	Gnavspil.
	Matto.	*Narr.*	*Blären.*	*Narren.*
00	*Mascherone.*	*Hex.*	*Arlequin.*	*Uglen.*
000	*Secchia.*	*Glass.*	*Pottan.*	*Potten.*
0000	*Nulla.*	*Teller.*	*Kraus.*	0
I		I	1	I
II		II	2	II
III		III	3	III
IIII		IIII	4	IIII
V		V	5	V
VI		VI	6	VI
VII		VII	7	VII
VIII		VIII	8	VIII
VIIII		IX	9	IX
X		X	10	X
		XI	11	XI
		XII	12	XII
		Würst.		
XI	*Taverna.*	*Einkert.*	*Wardshus.*	*Huset.*
		Auszahlt.		
XII	*Gnaf (cnao).*	*Miau.*	*Husu.*	*Katten.*
XIII	*Salto (salta)*	*Hott.*	*Cavall.*	*Hesten.*
XIV	*Tuffo.*	*Werda.*	*Husar.*	*Dragonen.*
XV	*Cucu.*	*Pfeift.*	*Cucu.*	*Gjegen.*

[1] Cat. No. 15736.

[2] Die Sammlung der Spielkarten des baierischen Nationalmuseums, München. 1884.

111. IGRALNYE KARTY. Playing-Cards.[1] Russia. Nineteenth Century.

Whist pack of fifty-two cards, French suit-marks, and court-cards similar to those of France.

The manufacture of playing-cards in Russia is a State monopoly, of which the revenue is applied to the support of the charitable establishment known as the "Institutions of the Empress Marie."

112. PLAYING-CARDS.[2] England.[3] Nineteenth century.

Whist pack of fifty two cards. Suits: Diamonds, Hearts, Spades, and Clubs.

According to Willshire, it is probable that cards made their way into England through France. The date of their introduction is not known, but it is believed they were not in use until after the reign of Henry IV (1405), and they were certainly employed previous to 1463. About 1484 they formed a common English Christmas pastime. England appears to have at once adopted the French suit-marks. The English names of the suits, however, are in part of Spanish descent.

113. PLAYING-CARDS.[4] Philadelphia,[5] United States. About 1860. "Club House" (Philadelphia Club).

Whist pack of fifty-two cards, ordinary suits; court-cards bear full-length figures instead of being double-headed.

Similar cards are still made for use in certain games.

114. PLAYING-CARDS.[6] "Union." New York,[7] United States. 1862.

Whist pack of fifty-two cards and a joker. The suit-marks are stars, flag of the United States, shield with national emblems, and national arms (eagle with shield). The Kings bear a picture of an infantry officer in full dress; the Queens, the Goddess of Liberty; and the Knaves, an artillery commissioned officer in full dress.[8]

115. PLAYING-CARDS.[9] "Picture Playing-Cards" (American Generals). New York,[10] United States. 1863.

Whist pack of fifty-two cards. Conventional suits. Each card bears the portrait of a General of the Union Army, the denomination of the card being displayed on a miniature card in the left-hand corner.

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[1] Cat. No. 16572, Mus. Arch., Univ. Penn.

[2] Cat. No. 15452, Mus. Arch., Univ. Penn.

[3] De La Rue & Co., London.

[4] Cat. No. 7603, Mus. Arch., Univ. Penn.

[5] Samuel Hart & Co.

[6] Cat. No. 154289, U.S.N.M. Gift of Stewart Culin.

[7] American Card Company.

[8] Mr. A. Howard Clark, to whom I am indebted for the identification of the uniforms, states that the rank of the infantry officer representing the King is not shown on epaulettes, "probably Colonel or Lieutenant Colonel; if a General, the buttons on coat would be arranged in groups. The rank of the artillery officer is not shown on shoulder straps."

[9] Cat. No. 7100, Mus. Arch., Univ. Penn.

[10] M. Nelson.

116. PLAYING-CARDS.[1] England. About 1863.

Whist pack of fifty-two cards with regular suit-marks. Backs bear Confederate flags and seal with legend, "Confederate States of America."

117. PLAYING-CARDS.[2] Harlequin. New York,[3] United States. 1879.

Whist pack of fifty-two cards with conventional suit-marks incorporated into comic pictures.

118. PLAYING-CARDS.[4] "Political Euchre." Philadelphia,[5] United States. 1888.

Pack of fifty-two cards and two jokers, with portraits of opposing candidates, the governors and number of electoral votes cast by each State.

119. PLAYING-CARDS.[6] Political Comic. New York,[7] United States, 1888.

Whist pack of fifty-two cards with joker and key to the face cards. The suit-marks are conventional. The court-cards bear caricature portraits of the politicians of the time.

120. PLAYING-CARDS.[8] World's Fair Souvenir. Chicago. 1893.

Whist pack of fifty-two cards and a joker (Uncle Sam). Views of Columbian Exposition, with denominations marked with suits, distinguished by letters and numerals, in corners. Kings bear portrait of Director-General Davis; Queens, Mrs. Potter Palmer; and Jacks, Columbus.

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[1] Cat. No. 126106, U.S.N.M. Presented by Mr. Paul Beckwith.
[2] Cat. No. 7601, Mus. Arch., Univ. Penn.
[3] Tiffany & Co.
[4] Cat. No. 7766, Mus. Arch., Univ. Penn.
[5] Lum Smith.
[6] Cat. No. 7101, Mus. Arch., Univ. Penn.
[7] A. H. Caffee.
[8] Cat. No. 16501 Mus. Arch., Univ. Penn.

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A DESCRIPTION OF THE EXHIBIT AT THE COTTON STATES INTERNATIONAL EXPOSITION, ATLANTA, 1895.

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BIBLICAL ANTIQUITIES.

A DESCRIPTION OF THE EXHIBIT AT THE COTTON STATES INTERNATIONAL EXPOSITION, ATLANTA, 1895.

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INTRODUCTION.

The Section of Oriental Antiquities in the U. S. National Museum was established in 1887, and in 1889 there was added to the Museum a Section of Religious Ceremonial Institutions. Although not at all identical in scope, it was found best for practical reasons that the exhibit of these two sections in the Atlanta Exposition should be united in the form of a collection which, for want of a better name, may be called Biblical Antiquities. The space allowed was an alcove 20 by 20 feet. All of the subdivisions of this subject were represented, so that there was no possibility of completeness in any direction. Nevertheless, the exhibit had an educational value, as being the first collection put together at an exposition which attempted to show in outline all of the possibilities of study in this most important field.

It has, therefore, seemed proper that a record be made of this collection as it was actually shown at Atlanta, in the order in which it was shown, and without any attempt to fill out the deficiencies which are known to have existed. Such a description will, it is hoped, be of service to teachers and students, and may possibly furnish a suggestion to those who are interested in the establishment of small collections which touch the interests of so many persons, who, without being special students and investigators, are yet deeply concerned in anything that relates to the archæology and history, the ethnology, and the art of that portion of the eastern world around the Mediterranean, to which the culture and civilization of later Europe and even of modern America can in a great degree be traced.

The limitations of space caused some apparent incongruities; nevertheless, it can be said that nothing was shown which did not bear upon Biblical history and antiquities.

THE LAND OF THE BIBLE.

MAP OF PALESTINE.—It is not possible to understand the geology, the flora, and fauna of a country, the habits and customs of the people, nor their history, without an idea of the physical features of the country studied. The first object shown, therefore, was a relief map of Palestine. This map is the result of geographical and geological survey work, carried on for more than ten years by experts in the service of the Palestine Exploration Fund. It is 7 feet 9 inches by 4 feet 1 inch in size and made on the scale of $\frac{1}{160}$, or three-eighths of an inch to the mile. It embraces the whole of western Palestine, from Baalbec in the north to Kadesh Barnea in the south, and shows nearly all that is known of the country east of the Jordan. The natural features of the country stand out prominently, being reinforced by appropriate colors. The mountains and plains are shaded a creamy white. The seas, lakes, marshes, and perennial streams are shown in blue. The Old and New Testament sites are marked in red. The map thus furnishes a most important aid for the understanding of the Bible narrative.[1]

GEOLOGY.

No attempt was made to present in systematic form the geology of the country nor to show in any way the features of the soil. The following specimens, which possess a sentimental interest merely, were placed in the collection.

DUST FROM JERUSALEM.—Dust from the Holy Land is with many Jews a much-cherished possession, perhaps suggested by Psalms cii, 14: "For thy servants take pleasure in her stones, and have pity upon her dust." It is sometimes placed in the graves, and is considered as a substitute for actual burial in the Holy Land, which is one of the pious aspirations of the orthodox Jew.

WATER FROM THE JORDAN.—The Jordan is one of the points of attraction for pilgrims to Palestine. As early as the time of Constantine (306 to 337) baptism in the Jordan was deemed a special privilege, on account of its association with John the Baptist and the baptism of Christ;[2] even now the Oriental Christians attach great importance to the bath in the Jordan, as the termination of a pilgrimage.[3]

The pilgrims usually fill jars from the river to be used for baptisms at home.

SMALL SHELL (*Janthina fragilis*) FROM TYRE.—Tyre was in ancient times the wealthiest and most magnificent of Phenician cities. It was situated on the Mediterranean, and consisted of two parts, Palaetyrus on the mainland and Neotyrus on the island. It was famous for the

[1] Compare the Survey of Western Palestine; the Survey of Eastern Palestine, and the Geology of Palestine and Arabia Petraea, published by the Palestine Exploration Fund.

[2] Matthew iii, 13–17.

[3] For a description of the bathing of the pilgrims see Sinai and Palestine, by Dean Stanley, New York, 1883, pp. 384–386.

precious purple dye, which was extensively prepared from the shellfish Murex. Tyre is often mentioned in the Bible under the name of Çor.[1] The modern Çur, on its site, is an unimportant town of about 5,000 inhabitants.

GRANITE FROM JEBEL MUSA.—Jebel Musa (mountain of Moses) is one of the peaks in the southeast of the Sinaitic Mountain range. It rises about 7,000 feet above the sea level, and tradition assigns to it the giving of the Law to Moses. The Sinaitic Mountain chain is formed of granite and porphyry. The quarries and mineral deposits of the Sinaitic Peninsula were worked as early as 3,000 B. C.

FLORA.

The flora, like the geology of the country, was but inadequately represented, the following specimens being the only ones shown:

SEED PODS OF THE CAROB TREE.—The carob or locust tree (*Ceratonia siliqua*) is common in Galilee, in the plain of Sharon, and in the countries around the Mediterranean Sea in general. The island of Cyprus alone produces at present about 30,000 tons of carobs, almost the whole of which is exported to England and France, and "this quantity is produced by hardly a third of the carob trees growing in the island, because perhaps the other two-thirds of these trees are not yet grafted."[2] Its fruit is a brown pod, from 6 to 12 inches long, about an inch broad, having a fleshy or mealy pulp, of an agreeable taste, which is not only ground up for cattle and swine, but also extensively used as food by the Arabs, Moors, and Italians. Large quantities of carob are used, especially in France, for distillation, and also for producing a sort of molasses[3] The English name is borrowed from the Oriental, probably coming from the Arabic[4] *Harrûb* through Spanish; it occurs in the Talmud in the form *Harûb*. It is generally assumed that the carob beans represent the "husks," in the Revised Version "pods of the carob tree," (in the Greek original κεράτιον, *keration*) in the parable of the Prodigal Son.[5] Through a confusion between the pods of the carob tree (also called locust) with the locusts (insects, Greek ἀκρίδες, *akrides*) which John the Baptist ate,[6] it was thought that the pods formed the food of John the Baptist, and they are still commonly called "St. John's bread."

SYCAMORE FROM PALESTINE.—The sycamore tree (*Ficus sycomorus*), Hebrew *shiqmah*, is represented in I Kings x, 27, as having been abundant in Palestine in the reign of Solomon: "The king made silver to be in Jerusalem as stones, and cedars made he to be as the sycamore trees that are in the lowland for abundance," and similarly we read in

[1] Ezekiel xxvi–xxviii, etc.

[2] P. G. Gennadius, Report on the Agriculture of Cyprus, Pt. 1, p. 17.

[3] *Idem.*, pp. 18, 19.

[4] It also occurs in French. See Remarques sur les mots français dérivés de l'arabe, par Henri Sommens, S. J., Beyrouth, 1890, p. 18.

[5] Luke xv, 16.

[6] Matthew iii, 4.

Isaiah ix, 9, 10, "the sycamores are cut down, but we will change them into cedars." The sycamore of the Bible has no natural alliance with the maple sycamores of Europe and North America. In flowers and foliage it closely resembles the common fig, but grows to a greater size, sometimes reaching a height of 30 or 40 feet and a diameter of 20 feet. It bears at least two crops annually, but they are small and insipid compared with those of the common fig tree (*Ficus carica*). Still they are gathered and used as food by the poorer classes. The prophet Amos describes himself as a "dresser of sycamore trees."[1] In the Egyptian cult the sycamore was symbolical of the tree of life, being dedicated to Hathor.

Apples of Sodom.—The apples of Sodom are considered by some to represent the nightshade (*Solanum sanctum*) which grows in bushes and thickets in warm regions and especially in the Jordan Valley. It is a shrubby plant, 3 or 4 feet high. Its blossoms resemble in color and form those of the potato, and the fruits are oval-shaped, first of yellow, but when ripe of a beautiful red color. The fruit is said to be turned into dust by the sting of an insect, leaving only the skin intact. Robinson identifies the fruit of the *Asclepias gigantea* with the apples of Sodom. This fruit resembles a large yellow apple. Externally of fair appearance, it bursts when pressed like a bubble filled with air, leaving only the shreds of a thin skin in the hand. The Orientals describe the *Asclepias gigantea* as a plant containing an astringent milky juice. (Arabic, *Yatû'*. Syriac, *Yetûa sebe'a helba.*[2])

Unripe pomegranate from Palestine.—The pomegranate (*Punica granatum;* Hebrew, *Rimmôn*) is enumerated among the plants characteristic of the promised land,[3] though it was not native there; it was and continues to be extensively cultivated in Palestine, and its failure is represented as a special punishment of God.[4] It grows wild in Persia, Afghanistan, and neighboring countries, and has been cultivated from time immemorial along the north and south coasts of the Mediterranean.[5]

It is still common in Tunis and Algiers, where it is called by the Arabs *rimân*, corresponding exactly to the ancient Hebrew name. It is a beautiful shrub, with dark and shining leaves and bell-shaped flowers. In the autumn it yields a ruddy fruit about the size of an orange, usually of a reddish tint, filled with a delicious pulp, in which semitransparent seeds lie in rows. It was appreciated for its fruit[6] and its wine,[7] which is made from the fermented juice. Its fruits and flowers were also used in medicine, and the rind for tanning leather. The manufacture of leather by means of it was introduced by the

[1] Amos vii, 14.

[2] Immanuel Loew, Aramaeische Pflanzennamen, Leipzig, 1881, p. 192.

[3] Deuteronomy viii, 8: "A land of pomegranates."

[4] Joel i, 12.

[5] Pliny Nat. Hist., XIII, 34.

[6] Canticles iv, 13: "an orchard of pomegranates with precious fruits."

[7] *Idem* viii, 2.

Moors from Africa into Spain, especially into Cordova, and the leather was hence called "Cordovan." It is still used in Morocco, the leather of which country retains its superiority, especially for bookbinding. The flowers and fruit of the pomegranate entered into the religious rites and symbolism of the Phenicians and ancient Romans, as well as of the ancient Israelites. The robe of the High Priest had an embroidery of "pomegranates of blue and of purple and of scarlet round about the skirt thereof,"[1] while the pomegranate also formed a decorative symbol in the columns of the Temple.[2] Hehn[3] says: "Religious intercourse in ancient times also brought the glorious pomegranate tree to Europe. Its purple blossoms in brilliant foliage and red-cheeked fruit rich in kernels must have from the beginning excited the imagination of the peoples of Western Asia, whose mode of thinking was symbolical. In the Odyssey, among the fruits in the garden of the king of the Pheaks, and among those that torment by their sight, the Phrygian Tantalus are also the pomegranates ῥοιαί (*rhoisi*), which name in itself bears decisive testimony to the origin of the plant in Semitic language and culture." "The name of the pomgranate fruit among the Portuguese is to the present day the Arabic *roma*, *romeira*."[4]

Cone of the cedar of Lebanon.—The cedar of Lebanon (*Cedrus libani*, Hebrew *Erez*) has its chief habitat in the ranges of the Taurus and Lebanon, the latter being its southernmost limit. The Old Testament abounds in references to the cedar of Lebanon. It was considered as the prince of trees, the emblem of all that is grand, magnificent, and durable: "The glory of Lebanon;[5] the trees of the Lord are satisfied; the cedars of Lebanon, which He hath planted;"[6] "the righteous shall flourish like the palm tree; he shall grow like a cedar in Lebanon."[7] Frequent references are also made to the economic uses of the cedar. It supplied the chief material for the woodwork of the temple of Solomon and the royal palaces,[8] the second temple of Zerubbabel,[9] and according to Josephus[10] was also used in the rebuilding of the temple by Herod. From the Assyrian inscriptions it is learned that the Assyrian kings procured the costly woods for their buildings from the Lebanon. Cedar timber was also used in the great Persian edifices at Persepolis, in the first temple of Diana at Ephesus, and that of Apollo at Utica, where the age of the cedar timber was computed at two thousand years. At present the forest of Lebanon

[1] Exodus xxviii, 33, 34.

[2] I Kings vii, 18–20.

[3] Kulturpflanzen und Hausthiere in ihrem Übergang aus Asien nach Griechenland und Italien sowie in das übrige Europa. Historisch-linguistische Skizzen, Berlin, 1870, p. 155.

[4] Quoted by Loew, p. 362.

[5] Isaiah xxxv, 2.

[6] Psalms civ, 16.

[7] *Idem* xcii, 12.

[8] I Kings vi and vii.

[9] Ezra iii, 7.

[10] Jewish War, v, 5, 2.

"is shorn of its glory," and only between 400 and 500 cedar trees are found in small groups in various parts of the mountain range, most of them in the valley of Kadisha, nearly 7,000 feet above the sea. The tree is still called by the Arabs *Arz*, identical with the ancient Hebrew name.[1]

CONE OF A LEBANON FIR.—The Hebrew word[2] *Berosh*, which is rendered by the English version "fir," probably comprises the other coniferous trees of Palestine, including junipers, pines, and the funeral cypress. Of the pine there are four species in Palestine. The most common is the Aleppo pine (*Pinus halepensis*), then the pinaster (*P. pinaster*), the stone (*P. pinea*), and the Pyrenean (*P. pyrenaica*). The *Juniperus excelsa* is very common, and the *Cypressus sempervirens* is the common species of western Asia and southern Europe. "Fir trees" are frequently referred to in the Old Testament in association with cedars of Lebanon, though the former were deemed inferior: "Howl, O fir tree, for the cedar is fallen."[3] "Fir" timber was used for the floors of the temple,[4] for ships' planks,[5] and for musical instruments.[6] The fruit is but once mentioned: "I am like a green fir tree; from me is thy fruit found."[7]

FAUNA.

Though for obvious reasons no attempt was made at a compete collection of the fauna of the Bible, a sufficient number of specimens was shown from each class to make the exhibit of this division of the natural history of the Bible in some measure representative.

MAMMALS.

The mammals were illustrated by the following specimens:

THE APE[8] (*Hanuman monkey, Semnopithecus entellus;* Hebrew, *Qof*).—The ape was not native in Palestine. It is mentioned in the Bible among the commodities brought to Solomon by the ships of Tarshish.[9] The Hebrew name for ape is cognate with that in the Tamil language (*Kapi*), and it is therefore assumed that the apes were brought from Ceylon or South India, where the genus *Semnopithecus* is especially frequent. The ape has also been identified among the animals depicted on the Assyrian monuments.

THE BAT (Hebrew, *Atalef*).—The bat is classed in the catalogue of animals[10] among the unclean birds, which are forbidden for food. In

[1] Immanuel Loew, Aramaeische Pflanzennamen, Leipzig, 1881, p. 57.

[2] Some authorities favor the rendering cypress.

[3] Zachariah xi, 2.

[4] I Kings vi, 15. The Revised Version gives cypress in the margin.

[5] Ezekiel xxvii, 5.

[6] II Samuel vi, 5.

[7] Hosea xiv, 8.

[8] Since the version of 1611 English usage has changed. Monkey, the more general term, would be a fitter rendering.

[9] I Kings x, 22, and the parallel passages in II Chronicles ix, 21.

[10] Leviticus xi, 19, 20; compare Deuteronomy xiv, 18.

Isaiah ii, 20, 21, bats are alluded to in company with moles as inhabiting holes and cavities about ruins; "In that day a man shall cast away his idols of silver, and his idols of gold which they made for him to worship, to the moles and to the bats to go into the caverns of the rocks, and into the clefts of the ragged rocks." Bats are still very numerous in Palestine, about twenty species being known. One of the most common is *Cynonycteris ægyptiaca*, a specimen of which was shown.

"CONEY"-ROCK-BADGER (*Procavia syriaca*, or *Hyrax syriacus;* Hebrew, *Shafan*).—In the English versions of the Bible the Hebrew *Shafan* is rendered "coney," which formerly was the common name for rabbit, although that usage is now obsolete. It is well known that the introduction of the rabbit into the East is of recent date, and that no rabbit was known to the ancient inhabitants of Bible lands.[1] Besides, while the rabbit has its dwelling place in sand or clay, the *Shafan* is enumerated in the Bible[2] among the "four things little upon earth, but exceeding wise, being but a feeble folk, yet they make their houses in the rock," and their attachment to rocks is also referred to in Psalms civ, 18: "The rocks are refuge for the *shefanim.*" The animal mentioned in these passages can not, therefore, have been a rabbit, and it is now assumed by all writers to be the *Procavia* or *Hyrax syriacus*, which belongs to an isolated group of hoofed mammals whose dentition manifests considerable similarity to the teeth of the rhinoceros. The hyrax is not as common in Palestine as formerly, but it is still found in some places, as in the gorge of the Kedron, on the west side of the Dead Sea, while at the summit of Jebel Musa, on Mount Sinai, a whole colony is in existence. The Arabs call the hyrax *wabr*, and describe it as the "little animal of the children of Israel" (*janamu bani Israil*).[3] In Abyssinia the hyrax is called *gehejat*, and its flesh is there used as food by the Mohammedans.[4] The Israelites counted it among the unclean animals.[5]

YOUNG CAMEL (*Camelus dromedarius*, Hebrew *Gamal*).—The camel was, and is still, one of the most useful beasts in Palestine. It is referred to in the Bible as being used for riding,[6] as a beast of burden,[7] and of draft.[8] It was also used in war.[9] Among Jacob's gifts to Esau were thirty milch camels (literally, "camels giving suck") with their colts.[10] The flesh of the camel was forbidden as food.[11] It is eaten now when better food can not be had in most parts of the East; but the meat is

[1] W. Houghton, Gleanings from the Natural History of the Ancients, pp. 139, 184.
[2] Proverbs xxx, 24 and 26.
[3] Fritz Hommel, Die Namen der Säugethiere bei den Südsemitischen Völkern, p. 322.
[4] Dr. B. Longravel in Zoologische Jahrbuecher, III, p. 336.
[5] Leviticus xi, 5; Deuteronomy xiv, 7.
[6] Genesis xxiv, 64.
[7] *Idem* xxxvii, 25; I Kings x, 2, etc.
[8] Isaiah xxi, 7.
[9] I Samuel xxx, 17.
[10] Genesis xxxii, 15.
[11] Leviticus xi, 4; Deuteronomy xiv, 7.

said to be very coarse and dry. The meat of a very young camel, however, is esteemed by the Arabs as a great luxury. The camel had many uses in the arts. Camel's hair was used for weaving into cloth. John the Baptist "had his raiment of camel's hair."[1] Tents, shields, harness, saddles, and even trunks are made of camel's skin. Two species, the one-humped camel (*Camelus dromedarius*) and the Bactrian two-humped camel (*Camelus bactrianus*), were known in Palestine, the former being more frequent. The camel was the subject of many proverbial expressions, two of which are by Jesus, Matthew xix, 24: "It is easier for a camel to go through a needle's eye than for a rich man to enter into the Kingdom of God," and xxiii, 24: "Strain out the gnat and swallow the camel." The word for camel is practically the same in most ancient and modern languages.

GAZELLE (*Gazella dorcas;* Hebrew, *Çebi*).—The gazelle (in the Authorized Version "roebuck," also translated "roe" in the Revised Version) was allowed as food.[2] It was provided for the royal table of Solomon.[3] The characteristics of swiftness and gentleness of these animals are often referred to[4] "as light of foot as a wild roe;"[5] "as swift as the roes upon the mountains;"[6] "The voice of my beloved; behold he cometh leaping upon the mountains, skipping upon the hills. My beloved is like a roe or a young hart."[7] The feminine form, in Hebrew *Çebiah*, in Aramean *Tabitha*, was often used as a proper name;[8] for example, "Now there was at Joppa a certain disciple named Tabitha, which by interpretation is called Dorcas." The Arabs call the gazelle *tabi* and employ it frequently in their love poetry as the image of feminine loveliness. More than twenty species of gazelle inhabit Africa, Arabia, Persia, India, and central Asia. The gazelle of Syria, Egypt, and Arabia is the *Gazella dorcas*. It is very common in Palestine, especially in the Judean wilderness and the Arabah.

MOUSE (Hebrew, *Akbar*).—The mouse is enumerated among the unclean "creeping things,"[9] "eating swine's flesh, and the abomination, and the mouse." Mice were sent as a plague upon the Philistines for having carried off the Ark of the Covenant.[10] No less than twenty species have been found in Palestine. The *Mus bactrianus*, which is especially plentiful and familiar, was given as an illustration.

BIRDS.

The birds enumerated in the Bible were represented by fourteen specimens.

THE COCK.—No mention is made of the cock in the Old Testament, but in the New Testament he is referred to in connection with Peter's

[1] Matthew iii, 4; Mark i, 6.
[2] Deuteronomy xii, 15, 22; xiv, 5; xv, 22.
[3] I Kings iv, 23.
[4] II Samuel ii, 18.
[5] I Chronicles xii, 8.
[6] Canticles ii, 8.
[7] *Idem*, viii, 14.
[8] II Kings xii; I Acts ix, 36.
[9] Leviticus xi, 29; Isaiah lxvi, 17.
[10] I Samuel vi.

denial of Jesus, when Jesus said to Peter, "The cock shall not crow this day until thou shalt thrice deny that thou knowest me."[1] It is said that in remembrance of the crowing of the cock, which brought Peter to a sense of his guilt, the practice began of placing weather-cocks upon towers and steeples.[2]

There is independent testimony from the Mishna that the cock had become common in Palestine. The Mishna was collected about 200 of the Christian era, but as many portions of it go back to at least three centuries earlier it is in some portions contemporary with and even earlier than the New Testament. According to the Mishna[3] the Jews were prohibited from selling a white cock to the heathens. This prohibition was compromised by the permission to sell if the toe were cut off, because "they do not sacrifice anything defective." The word for cock is "*Tarnegol*," Syriac *Tarnagla*. There is no Biblical Hebrew word for cock. In addition to the above the Talmud uses the word *Geber*, which means simply "male." The crowing of the cock is referred to a number of times in the Talmud, cock crow being a recognized time.[4] There are three that are strong (unyielding), says the Talmud, "Israel among the peoples; the dog among the beasts, and the cock among the birds." (*Beça* 5b.)

On Babylonian gems the cock appears as the herald of dawn, the heavenly guardian of light, who by his crowing drives away the demons of the night. The native country of the domestic cock is supposed to be India, and the migration of domestic fowl to western Asia and Europe probably took place with the Medo-Persian conquerors. As the Persians spread their dominions, the cock, the "Persian bird" went with them.

TURTLEDOVE (*Turtur risorius;* Hebrew, *Tor*).—The turtledove and the dove or pigeon (Hebrew, *Yonah*) are very frequently mentioned in the Bible. They were the only birds permitted as sacrifices.[5] Noah sent forth a dove three times from the ark. On its second flight it returned with an olive leaf,[6] which has since been regarded as the emblem of peace. Numerous allusions are made in the Scriptures to the simplicity, innocence, gentleness, and fidelity of the dove:[7] "Ephraim is like a silly dove without understanding."[8] "Be ye therefore wise as serpents, and harmless as doves." The turtledove is noted for the regularity of its migration:[9] "And the turtle and the swallow and the crane observe the time of their coming," compare Canticles ii, 11, 12. At present there are four species of dove and three species of turtledove inhabiting Palestine in large numbers.

GOLDEN EAGLE (*Aquila chrysaëtos;* Hebrew, *Nesher*).—The Hebrew

[1] Luke xxii, 34; John xiii, 38.
[2] Layard, Nineveh and Babylon, p. 458.
[3] Aboda Zara Idolatry, I, 5.
[4] Mishna Yoma, I, 8.
[5] Leviticus i, 14; v, 7; xii, 8; Luke ii, 24.
[6] Genesis viii, 8–11.
[7] Hosea vii, 11.
[8] Matthew x, 16.
[9] Jeremiah viii, 7.

term *Nesher*, which in the English Bible is invariably rendered "eagle," comprises large birds of prey in general, and perhaps particularly the griffon vulture. The golden eagle is quite common in Palestine. At least seven other distinct kinds have been observed. Numerous references are found in the Bible to the characteristics of the eagle: Its high soaring in the air;[1] its molting, as a symbol of the renewing of strength;[2] its strength;[3] its predatory habits;[4] its power of vision;[5] its care for its young, in comparison with God's sheltering care over his people.[6] The eagle, as emblematic of the divine attributes, is one of the four living creatures in the vision of Ezekiel (i, 10) and in the Apocalypse of John (iv, 7). It is also the emblem of John the Evangelist.

HOOPOE (*Upupa epops;* Hebrew, *Dukifath*).—It is probable that the Hebrew name *dukifath*, occurring in the list of unclean birds,[7] denotes the hoopoe, as the Revised Version translates it, and not the "lapwing," as rendered by the Authorized Version. The hoopoe feeds on insects in dunghills and marshy places, and is therefore considered a very filthy bird. It is very common in Egypt, where it is found throughout the winter. In Palestine it is a summer visitor. The Egyptians considered the hoopoe as symbolical of gratitude, because it repays the early kindness of its parents in their old age by trimming their wings and bringing them food when they are acquiring new plumage. The Arabs call it the "doctor," believing it to possess marvelous medicinal qualities, and they use its head in charms and incantations.

OWL.—Various Hebrew names are assigned by the English Version to different species of owl—*Yanshuf*, Leviticus xi, 17; Deuteronomy xiv, 16, "great owl;" *Kos*, in the same passage, "little owl."[8]

The owl belonged to the unclean birds, and is enumerated among the animals inhabiting deserted and dismal places.[9] The Egyptian eagle owl (*Bubo ascalaphus*) and the little owl (*Athene glaux*) are the most common species in Palestine. The latter known by the name of *Boomeh*

[1] Isaiah xl, 31: "They shall mount up with wings as eagles." Jeremiah xlix, 16, etc.

[2] "Thy youth is renewed like the eagle."—Psalms ciii, 5.

[3] Hosea viii, 1: "As an eagle he cometh against the house of the Lord."

[4] Job ix, 26: "As the eagle that swoopeth on the prey. Compare Proverbs xxx, 17; Matthew xxiv, 28.

[5] Job xxxix, 28, 29: "She dwelleth on the rock, and hath her lodging there upon the crag of the rock and the strong hold. From thence she spieth out the prey; her eyes behold it afar off."

[6] Deuteronomy xxxii, 11: "As an eagle that stirreth up her nest, that fluttereth over her young, he spread abroad his wings, he took them, he bare them on his pinions."

[7] Deuteronomy xiv, 18; Leviticus xi, 19.

[8] These names are disputed; some translate *Yanshuf* by "water fowl;" *Kos* by pelican, or falcon. Lilith (Isaiah xxxiv, 14), which is rendered in the Authorized Version by screech owl, in all probability means simply a specter. It is rendered in the Revised Version "night monster."

[9] Psalms cii, 6: "I am become as an owl of the waste places."

among the Arabs, is also called the "mother of ruins," as no ruin or tomb of pretension will readily be found without one. This species is a great favorite with the Arabs, being regarded as lucky and friendly to man.

PARTRIDGE (*Caccabis chucar*, Hebrew *Qore*).—Reference is made to the partridge in Samuel xxvi, 20, "as when one doth hunt a partridge in the mountains," and in Jeremiah xvii, 11, as the partridge (margin of Revised Version "sitteth on eggs which she hath not laid,") "gathereth young which she hath not brought forth," alluding to the ancient belief that the partridge was in the habit of stealing eggs and hatching them. Besides the chucar partridge, Hey's sand partridge (*Amnoperdix heyi*) is abundant in Palestine and in Sinai.

PEACOCK (*Pavo cristatus;* Hebrew, *Tukkiyim*).—The peacock is mentioned among the animals brought by Solomon's ships from Tarshish.[1] It is an Indian bird, and the Hebrew name can be traced to the Tamil *tokei* Malabar *tôgai*, *tôghai*, "the crested bird." In some parts of India it is very abundant and almost domesticated. It is venerated by the Hindus, and large flocks are kept at their temples. It made its appearance in Greece in the middle of the fifth century B. C., and was adopted at Samos as the sacred bird of Hera (Juno) at the temple of that goddess, the Heræum.

PELICAN (*Pelecanus onocrotalus;* Hebrew, *Qa'ath*).—The pelican is one of the unclean birds,[2] being regarded as an emblem of desolation and ruin.[3] From the habit of this bird of storing quantities of food in the large pouch attached to its lower mandible, for the purpose of feeding its young, which it does by pressing its beak against its breast, the fable arose that the pelican opened its breast with its beak and fed its young with its own blood, which seemed to derive support from the red tips at the end of the bill. Besides the common white pelican another species, the Dalmatian pelican (*Pelecanus crispus*), is found, but less commonly, on the coast of Syria.

QUAIL (*Coturnix communis;* Hebrew, *Selav*).—Quails are mentioned in the Bible only in connection with the miraculous supply of food which they formed for the Israelites upon two occasions, in the wilderness of Sin[4] and at Kibroth Hataavah.[5] They are the smallest representatives of the partridge family and breed in numbers in Palestine. They arrive in vast flocks by night in March and a few remain throughout the winter. Their flesh is considered a delicacy.

RAVEN (*Corvus corax;* Hebrew, *Oreb*).—The raven is the first bird mentioned by name in the Bible:[6] "And he sent forth a raven, and it

[1] I Kings x, 22; II Chronicles ix, 21.

[2] Leviticus xi, 18; Deuteronomy xiv, 17.

[3] Isaiah xxxiv, 11: "But the pelican and porcupine shall possess it;" Zephaniah ii, 14: "Both the pelican and the porcupine shall lodge in the chapters thereof."

[4] Exodus xvi, 13.

[5] Numbers xi, 31–32; compare Psalms lxxviii, 27, and cv, 40.

[6] Genesis viii, 7.

went forth to and fro, until the waters were dried up from off the earth." It was forbidden for food.[1] In several passages the raven is referred to as illustrating the care with which God watches over his creatures.[2] "He giveth to the beast his food, and to the young ravens which cry."[3] "Who provideth for the raven his food, when his young ones cry unto God, and wander for lack of meat."[4] "Consider the ravens, that they sow not, neither reap; which have no store chamber nor barn; and God feedeth them; of how much more value are ye than the birds." The custom of the ravens of attacking the eyes of young or sickly animals is alluded to in Proverbs xxx, 17: "The eye that mocketh at his father and despiseth to obey his mother, the ravens of the valley shall pick it out, and the young eagles shall eat it." The raven and allied species are abundant in Palestine.

SPARROW (*Passer domesticus;* Hebrew, *Çippor*).—The Hebrew word *çippor* denotes birds in general, being used especially, however, of small birds. In the following passages it appears to refer to the sparrow in particular: Psalm lxxxiv, 3: "The sparrow hath found her an house, and the swallow a nest for herself, where she may lay her young;" and Psalms cii, 7: "I watch, and become like a sparrow that is alone upon the house top." Jesus refers to the sparrow in illustration of God's benignant care of his creatures:[5] "Are not two sparrows sold for a farthing? and not one of them shall fall to the ground without your Father. But the very hairs of your head are all numbered. Fear not therefore, ye are of more value than many sparrows."[6] Several species of the sparrow occur in great abundance in Palestine, especially on the Plain of Gennesareth.

BLACK STORK (*Ciconia nigra;* Hebrew, *Hasidah*).—The stork was accounted an unclean bird.[7] It is a migrant,[8] "Yea, the stork in the heavens knoweth her appointed times," and built its nest in "the fir trees."[9] The Hebrew name *Hasidah* means the kind, the pious one (Latin, *pia avis*), owing to the filial piety and devotion which was attributed by the ancients to this bird.

The passage in Job xxxix, 13: "The wing of the ostrich rejoiceth, but her pinions and feathers are kindly (Hebrew, *hasidah*)" is thought to contain an allusion to the stork, whose treatment of the young is so different from that of the hard-breasted ostrich.[10]

Owing to this belief and to its feeding on noxious reptiles and insects

[1] Leviticus xi, 15; Deuteronomy xiv, 14.
[2] Psalms cxlvii, 9.
[3] Job xxxviii, 41.
[4] Luke xii, 24.
[5] Matthew x, 29–31.
[6] See also Luke xii, 6, 7.
[7] Leviticus xi, 19; Deuteronomy xiv, 18.
[8] Jeremiah viii, 7.
[9] Psalms civ, 17.
[10] I. M. Casanowicz Paronomasia in the Old Testament, p. 57.

the stork is a protected bird, and in parts of Europe and the East there is a heavy fine for molesting either the storks or their nests. Both the black and the white stork (*Ciconia alba*) occur in Palestine, the latter chiefly in winter; the former a migrant, passing to the north.

SWALLOW (*Chelidon rustica;* Hebrew, *Sis*, *Sus*, and *Deror*).—The swallow is referred to in Jeremiah viii, 7, as one of the birds which "observe the time of their coming." "As the sparrow in her wandering, as the swallow in her flying, so the curse that is causeless lighteth not."[1] Psalms, lxxxiv, 3: "Yea, the sparrow hath found her an house and the swallow a nest for herself." There are about half a dozen species of the swallow, and the closely allied martin, in Palestine. The common swallow abounds in the Mosque of Omar.

GRIFFON VULTURE (*Gyps fulvus*).—As was stated above under eagle, the Hebrew *Nesher*, which is rendered in the English Bible "eagle" comprises large predatory birds in general. Thus in Jeremiah xlix, 16, and Job xxxix, 27–30, the "eagle" is referred to as making its nest in the highest cliffs. "O, thou that dwellest in the clefts of the rock, that holdest the height of the hill; though thou shouldest make thy nest as high as the eagle, I will bring thee down from thence, saith the Lord": "Doth the eagle mount up at thy command, and make her nest on high? She dwelleth on the rock, and hath her lodging there, upon the crag of the rock, and the strong hold." This is especially characteristic of the griffon vulture. The passage in Micah i, 16; "Make thee bald * * * enlarge thy baldness as the eagle" can only refer to the vulture, which is devoid of true feathers on the head and neck. The griffon vulture is most abundant in Palestine. It breeds in colonies of aeries, the most notable of which are at Wady Kelt near Jericho, Mount Nebo, in the gorges of the Jabbok and the Litany River, at Mount Carmel, and in the valleys leading into the Plain of Genessareth.

REPTILES.

But four specimens of the reptiles of the Bible were exhibited.

FROG (Hebrew, *Çefarde'a*).—The frog is only mentioned in the Old Testament as the second plague inflicted on Egypt.[2] In Revelations xvi, 13, unclean spirits are spoken of as being in the likeness of frogs, which come out of the mouth of the dragon. The edible frog (*Rana esculenta*) is the only species which at present occurs in Egypt. In Palestine are found the green toad (*Bufo viridis*), and less commonly the African toad (*Bufo regularis*). The little tree frog (*Hyla arborea*) is also common in Sinai and Palestine.

LIZARD.—Leviticus xi, 30, mentions the names of a number of animals which are included among the creeping things that creep upon the earth. The *Leta'ah* (*Lacerta viridis* and *L. agilis*) is the only one traditionally rendered by lizard; but the present opinion is that the other names

[1] Proverbs xxvi, 2; compare Isaiah xxxviii, 14.

[2] Exodus viii, 2–14; compare Psalms lxxvii, 45; cv, 30.

are also kinds of lizards—the Revised Version furnishes this statement in the margin and translates great lizard, lizard, sand lizard, etc. The best lexicographical authority agrees with this view. Nor are we to be surprised at this number of words in Hebrew for lizard, since they are very abundant in Palestine, about forty species having been enumerated. Among the most common is the green lizard and its varieties.

VIPER (*Vipera aspis;* Hebrew, *Ef'eh*).—The generic name in Hebrew of any serpent is *Nahash*. The serpent is first mentioned in Genesis iii, 1, 13, where it is said to be more subtle than all the beasts of the field. Jesus alludes to the wisdom of the serpent,[1] "Be ye therefore wise as serpents and harmless as doves." The different species are referred to by various names—*pethen, shefifon, 'akshub, and çif'oni*, usually rendered by adder. The viper is mentioned in Isaiah xxx, 6; lix, 5; Job xx, 16: "The viper's tongue shall slay him," and often in the New Testament.[2] It is assumed that the viper that fastened on the hand of the Apostle Paul[3] was the *Vipera aspis*. Upward of thirty species have been found in Palestine.

INSECTS.

Six specimens of the insects of the Bible concluded the illustration of the Biblical fauna.

HORSEFLY (*Hippobosca equina;* Hebrew, *Arob*).—It is probable that the horsefly is meant by *arob* (English versions, "swarms of flies," "divers sorts of flies"), sent as a plague upon Egypt.[4] The rendering, "swarms of flies," as indicating a mixture of various insects, is very old, being found in the Talmud and in Jerome. The horsefly in Egypt settles on the human body, sucks blood, and produces festering sores. It is also the means of spreading ophthalmia.

BREEZE FLIES (*Hæmatopota plurialis* and *Chrysops-coecutiens*, Hebrew *Zebub*).—The name *Zebub* occurs but twice in the Old Testament, Isaiah vii, 18, as a figure of swarming and troublesome armies coming from Egypt, "The Lord shall hiss for the fly that is in the uttermost part of the rivers of Egypt and for the bee that is in the land of Assyria;" and Ecclesiastes x, 1, as corrupting ointment, "Dead flies cause the ointment of the perfumer to send forth a stinking savor; so doth a little folly outweigh wisdom and honor." A species of *Tabanus* or breeze fly is common in the valleys of the Jordan and the Nile, and is very injurious to animals; it attacks both man and beast.[5]

The Phenicians invoked against the flies Baalzebub,[6] the lord of flies, the god of Ekron.[7]

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[1] Matthew x, 16.

[2] Matthew iii, 7.

[3] Acts xxviii, 3.

[4] Exodus vii, 21–31; compare Psalms lxxviii, 45; cv, 31.

[5] Hart, Animals of the Bible, p. 101, 102; compare also Smith Dictionary, see *Baal*.

[6] In the New Testament, Beelzebub, Matthew x, 25.

[7] II Kings i, 2.

SACRED SCARABAEUS (*Ateuchus sacer*).—The *Ateuchus* was worshiped by the ancient Egyptians, and often represented by hieroglyphics and on monuments. Models of them in the most precious materials were worn as charms and buried with mummies. The insects themselves have also been found in coffins. It may be that the worship of the scarabaeus in Egypt was in some way connected with that of Baalzebub, the lord of flies, in Ekron.[1]

HORNET (*Vespa orientalis;* Hebrew, *Çir'ah*).—Hornets are spoken of in the Bible as an instrument in God's hands for the punishment and expulsion of the Canaanites.[2] "I will send the hornet before thee, which shall drive out the Hivite, the Canaanite, and the Hittite from before thee."[3] It is assumed by some that they are used figuratively for panic or terror. Hornets are abundant in Palestine, and were so in former times, as is perhaps indicated from the name of the city in Judah, Çore'ah, "place of hornets." There are at present four species in Palestine; the most common is *Vespa orientalis.*

LOCUST (*Acridium peregrinum;* Hebrew, *Arbeh*).—Of all the "creeping creatures" the locust is most frequently mentioned in the Bible. It occurs under nine different names (*hagab*, *hargol*, *sol'am*, *gazam*, *yeleq*, *hasil*, *geb or gob*, *çelaçal*), which probably denote different species. Locusts were one of the ten plagues inflicted on Egypt.[4] They were permitted as food,[5] and were the chief food of John the Baptist.[6] Among the Moorish Arabs they are held in high esteem as a stimulant, and in Central Arabia they are regarded as a dainty. Their appearance, habits, ravages, etc., are often referred to figuratively in the Scriptures as destructive armies, Nahum iii, 15–17: "Make thyself many as the locusts. * * * Thy crowned are as the locusts and thy marshals as the swarms of grasshoppers, which camp in the hedges in the cold day, but when the sun ariseth they flee away, and their place is not known where they are:"[7] "And the shapes of the locusts were like unto horses prepared for war * * *," etc. In Proverbs xxx, 27, they are enumerated among the "four things which are little upon the earth, but they are exceeding wise." "The locusts have no king, yet they go forth all of them by bands."

MOTH (Hebrew, *Ash*, *Sas*).—The destructiveness of the moth and its own extreme frailty are often referred to in the Bible as an illustration of the perishable nature of temporal things.[8] "Behold they all shall wax old as a garment; the moth shall eat them up."[9] "Lay not up for

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[1] II Kings i, 2.

[2] Exodus xxiii, 29; Deuteronomy vii, 20; Joshua xxiv, 12.

[3] Compare Deuteronomy vii, 20; Joshua xxiv, 12.

[4] Exodus x.

[5] Leviticus xi, 20–22.

[6] Matthew iii, 4; Mark i, 6. Compare above under "Pods of the carob tree."

[7] Proverbs xxx, 2; Revelation ix, 7.

[8] Isaiah i, 9.

[9] Matthew vi, 19, 20.

yourselves treasures upon earth, where moth and rust doth consume * * * ."[1] "Your riches are corrupted, and your garments are motheaten."[2] "Whose foundation is in the dust, which are crushed before the moth," and "He buildeth his house as the moth."[3] It is quite plain that at least in most of the passages the *Tineidae*, or clothes moths, are referred to.

PALESTINIAN ANTIQUITIES.

The next group consisted of a selection of objects from the antiquities and art of the peoples who were connected with the history told in the Scriptures. They were put on exhibition for the purpose of enabling the student or visitor to place himself in the position of one who lived in the times and the lands in which the books of the Bible were composed.

Of monuments and relics found in Palestine itself, the following were shown:

CAST OF THE MOABITE STONE.—In II Kings iii it is related that Mesha, the king of Moab, paid tribute to the kings of Israel, but that after the death of Ahab he rebelled. Thereupon Ahab's son, Joram, allied with Jehoshaphat, king of Judah, invaded Moab and shut up Mesha in Kir-Hareseth, situated a little to the east of the southern end of the Dead Sea. Mesha, in this emergency, offered his first born son as a sacrifice, in the presence of the invading army, to Chemosh, the principal divinity of the Moabites; whereupon the Israelites withdrew. Thus far the Biblical account.

In 1868 the Rev. A. F. Klein, a German missionary, discovered at Dhiban, the ruins of Dibon, the ancient capital of Moab,[4] a stone or stela with an inscription celebrating the achievements of Mesha. It was of dark blue basalt, 3 feet 8½ inches high, 2 feet 3½ inches wide, and 1 foot 1.78 inches thick, rounded at both ends and inscribed with thirty-four lines. The stone was in possession of the Beni Humaydah, a wild Arab tribe east of the Jordan. The Arabs, considering the stone so eagerly sought after by Europeans to be possessed of supernatural power, lit a fire under it and then threw cold water upon it, breaking it into fragments, which were distributed as charms among the different families of the tribe. M. Clermont Ganneau, at that time chancellor of the French consulate, had, previous to the breaking of the stone, been so fortunate as to obtain a paper impression of the entire inscription. Afterwards by careful work he succeeded in collecting most of the fragments, so that six-sevenths of the inscription has been preserved and two-thirds of the stone itself is now in the Louvre at Paris.

In the inscription Mesha relates that Omri and Ahab had oppressed the land of Moab for many years, until he recovered several cities from

[1] James v, 2.
[2] Job iv, 18, 19.
[3] Job xxvii, 18.
[4] Numbers xxi, 30; xxxii, 34; Isaiah xv, 2.

the Israelites, mentioning Medeba,[1] Ataroth,[2] and Nebo,[3] where he slew 7,000 people and captured Jahaz, which had been built by the King of Israel. At the conclusion he also mentions a battle against Horonaim, which is generally interpreted as referring to a successful war with the Edomites who might have invaded the country from the south. It will thus be seen that the contents of this comparatively brief historical document add considerably to our knowledge of the happenings in the ancient world in the ninth century B. C. The dialect of the inscription differs but slightly from Hebrew, and the characters employed are those of ancient Hebrew, the so-called Samaritan or Phenician. Aside from its historical interest just mentioned, the Moabite stone is the most important surviving relic of the Moabite civilization. It is the oldest monument bearing a Semitic inscription, and its discovery was of great importance for the history of the development of the alphabet, proving, as it does, that the Greeks added nothing to the alphabet which they received from the East.[4]

CAST OF THE SILOAM INSCRIPTION.—The pool or fountain of Siloam, Hebrew, *Shiloah*, i. e., "sending," is mentioned in Isaiah viii, 6; "the waters of Shiloah that go softly"[5] where Jesus sends a blind man to wash in the pool "and he came seeing." It is at the southeast end of Jerusalem and was fed by the waters of a spring of the Gihon, the modern fountain of the Virgin, with which it is connected by a winding tunnel, cut for a distance of 1,708 feet through the solid rock.

The Siloam inscription was accidentally discovered in June, 1880, by a schoolboy, who, while playing with other boys near the pool of Siloam and wading up a channel cut in the rock which leads into the pool, slipped and fell into the water. On rising to the surface he noticed what looked like letters on the wall of the channel; this fact he reported to Mr. Schick, the well-known architect and archæologist of Jerusalem. Mr. Schick announced the discovery to the German Palestine Exploration Society (Deutscher Palaestina Verein), and with much labor made copies during the winter of 1880–81, which were sent to Europe. Owing, however, to the fact that the characters had become filled with a deposit of lime these copies were practically unintelligible.[6]

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[1] Numbers xxi, 30; Joshua xiii, 9, etc.

[2] Numbers xxxii, 34; Joshua xvi, 2, etc.

[3] Numbers xxxii, 3; Isaiah xv, 2, etc.

[4] The inscription has been translated by Noeldeke, Ginsburg, Ganneau, Schlottmann, W. Hayes Ward, Wright, Smend, and Socin, Die Inschrift des Koenigs Mesa von Moab, Freiburg, 1886, and Canon Driver, Notes on the Hebrew Text of the Books of Samuel, with an Introduction on Hebrew Paleography, and the Ancient Versions and Facsimiles of Inscriptions, Oxford and New York, 1890, pp. lxxxiv–xciv; compare also A. H. Sayce, Fresh Light from the Ancient Monuments, p. 91.

[5] Nehemiah iii, 15, and John ix, 7.

[6] A curious controversy has arisen as to the credit for the work of lowering the level of the water in the channel to render the inscription accessible. Dr. Guthe, in the Zeitschrift der Deutschen Morgenländischen Gesellschaft, XXXVI, p. 726, claims that it was done at the expense of the German Palestine Exploration Society; while the same claim is made for the London Palestine Exploration Fund. Quarterly Statement, 1881, p. 142; 1882, p. 1.

The first legible copies were made by Prof. A. H. Sayce, who came to Jerusalem in February, 1881. He spent three afternoons in the tunnel, sitting in water 4 to 6 inches deep, the conduit being dimly lighted by a candle held by his companion, Mr. Slater.[1] Another copy was independently made by the Rev. W. T. Pilter.

In March, 1881, Dr. Guthe, head of the German Palestine Exploration Society, went to Jerusalem, and after making as exact a drawing as possible of the inscription as it stood, he removed the lime deposit by the application of hydrochloric acid. This rendered feasible the taking of an adequate impression of the inscription. Squeezes and plaster impressions were subsequently made by Dr. Guthe, Lieuts. Claude R. Conder and Mantel.[2]

In 1891 the Siloam inscription was cut out of its place in the tunnel and carried away. It was found in the house of a Greek living near Jerusalem on the Hebron road, and the fact reported to the authorities at Constantinople. The Turkish law makes all monuments public property, and the minister of public instruction ordered the inscription sent to Constantinople. So important, however, was the matter deemed that it was considered at a council of ministers, and a peremptory telegram was sent by the Grand Vizier to the Pasha of Jerusalem to use all means to secure possession of this priceless monument and forward it with dispatch to the capital.[3] This action had the desired result and the Siloam inscription is now preserved at the Imperial Museum in Constantinople.

The contents of the inscription, which consists of six lines, are as follows: "Behold the excavation! And this was the manner of the excavation, while [the excavators] were lifting up the pick, each to his neighbor, and while 3 cubits [of rock remained] the voice of one called to his fellow-workman, for there was a fissure in the rock on the right hand. * * * And on the day [or, to the west] of the excavation the excavators struck, each so as to meet his fellow, pick against pick, and there flowed the water from the source to the pool through the space of 1,000 cubits, and * * * cubit was the height of the rock over the head of the excavation."

The inscription would seem to show that the work of excavation was undertaken simultaneously from both ends by two gangs of workmen, and that for want of engineering skill the borings overlapped.

Judging by the form of the letters the inscription must have originated between the eighth and sixth centuries. The most generally accepted opinion is, that it dates from the reign of Hezekiah, and is referred to in II Chronicles xxxii, 4 and 30: "So there was gathered much people together, and they stopped all the fountains, and the brook that flowed through the midst of the land, saying, why should

[1] Quarterly Statement, 1881, p. 143.

[2] Quarterly Statement, 1881, p. 285; 1882, p. 123.

[3] The above account is written from personal knowledge. For a slightly different account see Quarterly Statement, 1891, pp. 2, 88; 1894, pp. 271, 272.

the kings of Assyria come and find much water?" and "This same Hezekiah also stopped the upper springs of the waters of Gihon, and brought them straight down on the west side of the City of David." It is certainly one of the oldest known Hebrew inscriptions.[1]

CAST OF THE LACHISH TABLET.—Lachish was one of the capitals of the Canaanites, situated southeast of Jerusalem, between Gaza and Eleutheropolis. It was conquered by Joshua.[2] The Assyrian King Sennacherib besieged it during his invasion of Judah, 701 B. C.,[3] and, according to the Assyrian inscriptions, captured it. An interesting Assyrian relief represents Sennacherib seated on a throne receiving the tribute of his captives and vassals, accompanied by an inscription containing the statement that the decree was enacted at Lachish. Later on it succumbed to Nebuchadnezzar. The ruins of ancient Lachish, now called Tell el-Hesy, have been explored during the last few years by the Palestine Exploration Fund, and in 1892 Dr. F. Jones Bliss, an American archæologist in charge of the work, discovered there a small clay tablet, inscribed with cuneiform characters, and in a Semitic dialect akin to the Aramaic. The inscription dates before the conquest of Palestine by the Israelites, and contains a letter from the chief of the territory adjoining Lachish, probably to the governor of Lachish, complaining that marauders from the neighboring region are besetting Atim, which is probably identical with Etam, in the south of Judah, mentioned in I Chronicles iv, 32, and Samhi or Sam'a, now probably represented by the large ruin of Sam'ah, 5 miles to the south of Etam. The original is now in possession of the Turkish Government.[4]

CAST OF THE SEAL OF HAGGAI, SON OF SHEBANIAH.—The original seal of black stone was found in 1857 by Sir Charles Warren, near the Haram-esh-Sherif, the mosque of Omar on the site of the temple at Jerusalem.[5] The names Haggai and Shebaniah, which the seal bears, have not been identified. They are possibly connected with the rebuilding of the temple after the exile.

The use of seals or signet rings is already mentioned in the Patriarchal epoch.[6] The seal was either hung on a string around the neck

[1] E. J. Pilcher, in the Proceedings of the Biblical Archæology Society, XIX, pp. 165–182, would place the Siloam inscription as late as the time of Herod I (47–4 B. C.); compare, however, the arguments for the usual date of about 700 B. C. by Lieut. Col. C. R. Conder in the Palestine Exploration Quarterly Statement, 1897, pp. 204–208. Compare *Idem*, 1881, pp. 141–157, 282–297; 1894, pp. 269–277; Canon Driver, Notes on the Hebrew Text of the Books of Samuel, etc., pp. xiv. The "Higher Criticism" and the Verdict of the Monuments by A. H. Sayce, 2d. ed., London, 1894, p. 376.

[2] Joshua x, 3, 31 and 32.

[3] II Kings xviii and xix; Isaiah xxxvi and xxxvii.

[4] A. H. Sayce, Palestine Exploration Fund, Quarterly Statement, 1893, pp. 25–30, and C. R. Conder, The Tell Amarna Tablets, pp. 131–134.

[5] See the Recovery of Jerusalem, by Captain Wilson, R. E., Captain Warren, R. E., with an introduction by Arthur Penryhn Stanley, edited by Walter Morrison, New York, 1871, pp. 95, 385.

[6] Genesis xxxviii, 18. E. J. Pilcher in the Proceedings of the Society of Biblical Archæology, xix, p. 172, attributes the seal to the time of Herod I (37–4 B. C.), because it was found at the base of the temple wall.

or worn in rings on the finger;[1] "though Coniah, the son of Jehoiakim, King of Judah, were the signet upon my right hand, yet I would pluck thee hence." The seal was used for signing letters and documents.[2] "So she wrote letters in Ahab's name, and sealed them with his seal;" for sealing purses.[3] "My transgression is sealed up in a bag," doors and the like.[4] "So they went and made the sepulchre sure, sealing the stone." The custom of making an impression with the seal upon the forehead of a person is alluded to in the Epistle to the Galatians vi, 17: "I bear branded on my body the marks of Jesus," and Revelations vii, 3 and 4: "Hurt not the earth, neither the sea, nor the trees, till we shall have sealed the servants of our God on their foreheads."

Biblical weights.—The weights (like the measures) of the Hebrews are usually traced to the Babylonian system, which is considered the parent of other oriental systems. The unit of the Hebrew weights was the *shekel;* the other weights were either its multiples or fractions. The weights mentioned in the Bible are as follows: Talent[5] (*kikkar*), equals 60 minas or 3,600 shekels, equal to about 674,000 grains Troy; mina[6] (*maneh*), equals 60 shekels, equal to about 11,000 grains Troy; shekel (*sheqel*), equal to about 220 grains, one-twentieth (*gerah*) of a shekel,[7] or about 11 grains.[8] Scales, *mo'znayim*, consisted of a beam resting at its central point on a standard, and having suspended from its two ends two scales or basins in which the weights and the substances to be weighed were placed respectively.[9] Alongside of the *moznayim* there is also mentioned *peles*,[10] which is assumed to answer to the modern steelyard, also called Roman balance or beam, consisting of a lever in the form of a slender iron bar with one arm very short, the other divided by equidistant notches, having a small cross piece as a fulcrum to which a bearing for suspension is attached, usually a hook at the short end, and a weight moving upon the long arm. The weights themselves were called in the Hebrew "stones," rendered "weights" in the English versions.

Cast of an ancient Hebrew weight.—The original, which is of hematite, was obtained by Dr. Th. Chaplin, in Samaria. The weight is spindle shaped, somewhat flattened on one side, and weighs about 40 grains. It has on both sides a Hebrew legend, which is interpreted to mean "Quarter of a quarter of neçeg," which may have been a standard weight in Palestine.[11]

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[1] Jeremiah xxii, 24.
[2] I Kings xxi, 8.
[3] Job xiv, 17.
[4] Matthew xxvii, 66.
[5] I Kings ix, 14; x, 10, 14; II Kings v, 23. Compare Matthew xviii, 24.
[6] Ezekiel xlv, 12.
[7] Exodus xxx, 13; Leviticus xxvii, 25; Ezekiel xlv, 12.
[8] Psalms lxii, 9; Proverbs xi, I; xvi, II; xx, 23; Job vi, 2; xxxi, 6.
[9] E. C. Bissell, Biblical Antiquities, Philadelphia, 1888.
[10] Isaiah xl, 12; Proverbs xvi, II.
[11] Palestine Exploration Fund, Quarterly Statement, 1890, p. 267; 1894, pp. 220–231, 284–287.

CAST OF A BEAD.—The original, a reddish perforated yellow stone, was obtained by Prof. T. F. Wright, in Jerusalem. It weighs 134 grains, and is inscribed with the word neçeg in the same characters as those of the Siloam inscription. It was probably used as a weight, and the inscription may mean "standard weight."[1]

MUSICAL INSTRUMENTS.

As of great general interest for the history of culture there was shown a collection of musical instruments mentioned in the Bible, supplemented by photographs and casts of representations of musical instruments on ancient monuments. Scarcely any authentic information is preserved concerning the shape or the manner of playing on the musical instruments named in the Bible. The instruments exhibited were such as are now in use in the Oriental countries. But it may be assumed that the musical instruments of the Hebrews resembled those of the nations with which they came in contact, and that, considering the stability and conservatism of the East, the instruments still used in Palestine, Syria, and Egypt differ but little, if at all, from those employed in ancient times.

It is well known that music occupies an important place in the Bible. Its invention is recorded in the opening chapters of the Scriptures, where Jubal is named as the "father (i. e., founder) of all such as handle the harp and pipe."[2] From the earliest times music was of high importance among the Israelites, accompanying all the great national events and adorning the festal occasions. The hymn of thanksgiving after the deliverance from the bondage of Egypt and the passing through the Red Sea[3] was accompanied by the sound of timbrels and by dances of a choir of women led by the prophetess Miriam.[4] The solemnity of the giving of the law on Sinai was enhanced by the sound of the horn or *shofar*,[5] and the same instrument is mentioned at the capture of Jericho, the first conquest made in the Promised Land.[6] The sound of trumpets and of the horn announced and inaugurated the great festivals and the year of "Jubilee."[7]

But music also permeated the common daily life in Israel, and the absence of the "mirth of tabrets" and the "joy of the harp" was one of the signs of a national calamity.[8] It was the pastime of the shepherd;[9] it formed the principal attraction of the social gatherings of youth at the city gates;[10] it heightened the mirth at the festivals of the harvest

[1] Palestine Exploration Fund, Quarterly Statement, 1893, pp. 32, 257.
[2] Hebrew, *Kinnor* and *'Ugab*, Genesis iv, 21.
[3] Exodus xv.
[4] Verse 20.
[5] Exodus xix, 16, 19.
[6] Joshua vi, 5.
[7] Numbers x, 10; xxix, 1; Leviticus xxv, 8, 9.
[8] Isaiah xxiv, 8; Lamentation v, 14.
[9] I Samuel xvi, 18.
[10] Lamentation v, 14.

and vintage;[1] it contributed to the pleasure and festivity of the banquet;[2] the victors in battle were received on their return with "singing, dancing, and timbrels."[3] In short, music seems to have been the indispensable accompaniment of every public occasion, whether joyous or sad.[4]

But it was in religious worship that music attained its highest development in Israel, and it is to the time of David that the extensive use of music in religious service, both vocal and instrumental, was ascribed. From the 38,000 Levites 4,000 were elected and organized under 288 leaders into a chorus and orchestra to provide for the music of the sanctuary. The 288 classes were separated into 42 divisions under the sons of Asaph, Jeduthun, and Heman, as masters, and the entire chorus and orchestra was under the direction of Asaph, Jeduthun, and Heman.[5] These sanctuary musicians also officiated at the dedication of the temple by Solomon.[6] Under the later idolatrous kings it may be assumed that the music, like the worship of the temple, was often neglected. It is, on the other hand, especially mentioned that the pious kings, Hezekiah and Josiah, gave much attention to the musical services of the temple.[7] It was employed at the restoration of the temple and the walls of Jerusalem after the return from the exile;[8] and from post-biblical writings, especially Josephus, it is known that it continued to form a prominent feature of Jewish worship.

The musical instruments mentioned in the Bible may be divided, after the usual classifications, into the following groups:

(1) Instruments of percussion, which were beaten or shaken to produce sound for the purpose of regulating the rhythmic element in music. These instruments were presumably the first used, and are still common among the less cultivated peoples.

(2) Wind instruments.

(3) String instruments, which were always played with the fingers or with the plectrum, and not, like the modern violin, with a bow.

Of the instruments mentioned in the Bible, two—the ram's horn and the trumpet—are commanded to be used for sacred purposes.[9] These two instruments are also the only ones concerning whose shape there is absolute certainty.

Of the trumpet there is a representation extant on the Arch of Titus at Rome, while there is no doubt that the ram's horn which is still used in the synagogue has conserved its antique form.[10]

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[1] Isaiah xvi, 10.

[2] Isaiah v, 12; Amos vi, 5; II Samuel xix, 35.

[3] Exodus xv, 21; Judges xi, 34; I Samuel xviii, 6.

[4] Genesis xxxi, 27; Luke xv, 25; II Chronicles xxxv, 25; Matthew ix, 23; Jeremiah ix, 17, 18, and 19.

[5] I Chronicles xxiii, 5; xxv, 7.

[6] II Chronicles v, 12, 13.

[7] II Chronicles xxix, 25; xxxv, 15.

[8] Ezra iii, 10, 11; Nehemiah xi, 17, 22; xii, 28.

[9] Leviticus xxiii, 24; xxv, 9; Numbers x, 2.

[10] Johann Weiss, Die musikalischen Instrumente in den Heiligen Schriften des Alten Testamentes, Gratz, 1895.

EXPLANATION OF PLATE 1.

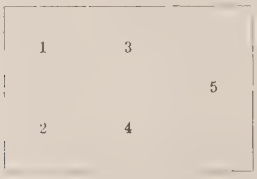


Fig. 1. CASTANETS.
(Cat. No. 95174, U. S. N. M. Beirut, Syria. Collected by Erhard Bessinger, U. S. Consul.)

Fig. 2. CYMBALS (*meciltayim*).
(Cat. No. 95173, U. S. N. M. Cairo, Egypt. Collected by Louis B. Grant, U. S. Vice-Consul.)

Fig. 3. ROUND TABRET (*tof*).
(Cat. No. 95151, U. S. N. M. Beirut, Syria. Collected by Erhard Bissinger, U. S. Consul.)

Fig. 4. FOUR-SIDED TABRET.
(Cat. No. 95779, U. S. N. M. Morocco, Africa. Collected by Dr. Talcott Williams.)

Fig. 5. KETTLE-DRUM.
(Cat. No. 95175, U. S. N. M. Cairo, Egypt. Collected by Louis B. Grant, U. S. Vice-Consul.)

MUSICAL INSTRUMENTS OF PERCUSSION.

The instruments exhibited, of which illustrations are given here, were as follows:

I.—INSTRUMENTS OF PERCUSSION.

(1) ROUND TABRET, HAND-DRUM (Hebrew, *Tof*).—From Beirut, Syria, where it is called *rikk*. (See plate 1, fig. 3.) The Arabic name *duff* agrees with the Hebrew, and is the parent of the Spanish *aduffa*.

The tabret or timbrel is mentioned in Genesis xxxi, 27. Its use survived from the earliest time to the present day in Asia, Greece, and Italy. On old Grecian monuments the tabret is seen in the hands of Bacchantes and priests of Cybele. On the Egyptian sculptures two forms of the tabret are represented, the round and the four-sided. The use of the striker seems not to have been known in antiquity. The tabret was beaten with the hand and was suspended from the neck by a ribbon. Later modifications of the tabret resemble our drum and the kettle-drum. The use of the tabret was confined to joyous occasions. It served with other instruments of song[1] to accentuate the rhythm of the dance.[2] It was played mostly by women, accompanying the harp and lute, at joyous feasts,[3] at the reception of victorious generals,[4] at banquets,[5] and at weddings.[6] In solemn processions it was also played by men.[7] The tabret is not mentioned among the instruments used in the religious services of the tabernacle or temple.

(2) FOUR-SIDED TABRET, Morocco, Africa. (See plate 1, fig. 4.)

(3) KETTLEDRUM (Arabic, *Naggarah*), Cairo, Egypt. (See plate 1, fig. 5.)—The kettledrum is made either of wood or copper, one side being rounded, the other flat, on which the skin (of a goat or gazelle) is stretched. It is now used in military bands, orchestras, and short solo passages. It is also employed by the dervishes to produce excitement in their devotions. The kettledrum is sounded with blows from a soft-headed, elastic mallet, stick, or a leather thong.

(4) CYMBALS (Hebrew, *Meçiltayim*, *Çelçelîm*). (See plate 1, fig. 2.) These two Hebrew words, which are usually considered identical, are plainly onomatopoeic. Though it is hardly likely that they indicated the same instrument, we have at present no certain method of differentiating them. *Meçiltayim* is almost invariably in the dual form, which indicates two similar parts, and in one passage[8] the material of which they were made, copper or brass, is named. Cymbals are mentioned only in connection with religious ceremonies.[9]

[1] Genesis xxxi, 27; Psalms lxxxi, 2.

[2] Exodus xv, 20; Judges xi, 34; I Samuel xviii, 6; Jeremiah xxxi, 4; Psalms cl, 4.

[3] Isaiah xxiv, 8; xxx, 32; Job xxi, 12.

[4] Judges xi, 34; I Samuel xviii, 6.

[5] Isaiah v, 12.

[6] I Maccabees ix, 39.

[7] II Samuel vi, 5, and I Chronicles xiii, 8.

[8] I Chronicles xv, 19.

[9] II Samuel vi, 5; I Chronicles xiii, 8; xv, 16, 19, 28; xvi, 5, 42; xxv, 1, 6; II Chronicles v, 12, 13; xxix, 25; Ezra iii, 10; Nehemiah xii, 27; Psalms cl, 5.

The cymbals now used in the Orient are much like those depicted on the Egyptian and Assyrian monuments. They consisted of two large plates of metal with wide, flat rims, and were played by being strapped to the hands and clashed together. Others were conical, or cup-like, with thin edges, and were played by bringing down the one sharply on the other, while held stationary, eliciting a high-pitched note. Cymbals were made of brass, and it is probable that they were the first among musical instruments made of metal. They were represented by a specimen from Cairo, Egypt, called by the Arabs *Ka's*.

(5) CASTANETS.—(See plate 1, fig. 1.) Some scholars apply the Hebrew names for cymbals, *Çelçelim* and *Meçiltayim*, which denote a jingling sound, also to castanets; others think these are meant by the *Çilçele-stema* (R. V. "Loud cymbals") Psalms cl, 5. But this is by no means certain.

II.—WIND INSTRUMENTS.

(1) RAM'S HORN (Hebrew, *Shofar*). (See plate 2, fig. 2.)—The Shofar, in the English versions usually inaccurately translated trumpet, or even more inaccurately cornet, is first mentioned in the Bible in connection with the giving of the law on Sinai.[1] Its use is ordered in the Pentateuch for the announcement of the new moon and solemn feasts[2] and the proclamation of the year of release.[3] New Year's Day (the first of the seventh month, or *Tishri*) is called a "memorial day of blowing."[4] The *Shofar* also served in religious processions,[5] and is mentioned, along with other musical instruments as a proper accompaniment of psalmody: "Praise Him with the blowing of the shofar, praise Him with the psaltery and harp."[6] But the most ancient and most frequent use of the shofar was for military purposes, to give the signal for the rallying of the people and for attacking and pursuing the enemy. Animal horns were similarly used in the Roman army.[7] The shofar is not only the sole instrument of those mentioned in the Bible which is still employed by the Jews in their religious services of the synagogue during the penitential month of *Elul* (July–August), on New Year's Day, or *Rosh ha-Shanah*, the first of *Tishri* (August–September), and on Atonement Day, or *Yom Kippur*, the tenth of *Tishri*, but is also, according to authorities on musical instruments, the oldest form of wind instrument known to be retained in use. It is usually made of a ram's horn, though the goat's horn is also employed.[8]

[1] Exodus xix, 16; xx, 18.

[2] Numbers x, 10; compare Psalms lxxxi, 4.

[3] Leviticus xxv, 9.

[4] Leviticus xxiii, 24; Number xxix, 1.

[5] II Samuel vi, 15; I Chronicles xv, 28.

[6] Psalms cl, 3; compare xcviii, 6.

[7] Varro, De lingua Latina v, 117; ea (cornua) quae nunc sunt ex aere, tunc fiebant e bubulo cornu.

[8] Cyrus Adler, "The Shofar, its use and origin (Proc. U. S. Nat. Mus., XVI, pp. 287–301; Report U. S. Nat. Mus., 1892, pp. 437–450).

EXPLANATION OF PLATE 2.

Fig. 1. REEDS OR PAN PIPES.
(Cat. No. 95705, U. S. N. M. Cairo, Egypt. Collected by Dr. G. Brown Goode.)

Fig. 2. RAM'S HORN (*shofar*).
(Cat. No. 95142, U. S. N. M. Deposited by Dr. Cyrus Adler.)

Fig. 3. DOUBLE FLUTE.
(Cat. No. 95654, U. S. N. M. Bethlehem, Palestine. Collected by Dr. G. Brown Goode.)

Fig. 4. FLUTE (*halil*).
(Cat. No. 95695, U. S. N. M. Damascus, Syria. Collected by Dr. G. Brown Goode.)

(2) TRUMPET (Hebrew, *Haçoçerah*), Morocco, where it is called *n'feer*. (See plate 3.)—The trumpet was expressly designed in the Pentateuch for sacred uses, two being ordered to be made of silver,[1] while Solomon increased their number to one hundred and twenty.[2] It was almost exclusively a priestly instrument.[3] Its primary use was for giving signals for the people to assemble.[4] Later it was appropriated to religious services[5] and festive occasions.[6] According to the representation on the Arch of Titus, the trumpet was narrow and straight, with a ball-like protuberance at the bottom. It was represented by its modern survival, the *n'feer* of Morocco. The instrument itself was supplemented by a photograph of the Arch of Titus. (See plate 5.)

(3) FLUTE OR PIPE (Hebrew, *Halil;* Revised Version, flute.) Damascus, Syria. (See plate 2, fig. 4.) The pipe or flute, now called in Syria *Shubab*, was a favorite instrument of the ancients. In its simplest form it was a reed or variety of wood in the shape of a reed, about 18 inches in length, bored throughout evenly, and pierced with holes in the sides for notes. Later, even ivory was employed. A variety of flutes are exhibited in the representations of Egyptian, Oriental, and Grecian musical instruments. They may be divided into simple flutes, which were either direct or transverse double flutes with even or uneven tubes, and those with several tubes.

The invention of the simple flute is ascribed by the Greeks to the Egyptians;[7] that of the transverse flute likewise to the Egyptians,[8] or to the Lybians.[9] The double flute is seen on Egyptian and Assyrian monuments. Among the Greeks and Romans the flute was played by the Bacchants, at funerals, and also at festive banquets. The Lacedaemonians, Cretans, and Lybians used it also for military purposes. In the Bible the flute is not mentioned among the musical instruments of the Temple; but it was employed on various festal occasions—at the accession of Solomon to the throne[10] and other festivities,[11] as well as at funerals.[12] According to post Biblical sources of information, flutes were used in the daily service of the second temple.[13]

(4) DOUBLE FLUTE, Bethlehem, Palestine. (See plate 2, fig. 3.) This instrument is assumed by some to represent the *Sumponiah* (sym-

[1] Numbers x, 1–10.

[2] II Chronicles v, 12.

[3] Numbers x, 2–10; xxxi, 6; II Chronicles xiii, 12, 14.

[4] See Numbers x, 5, 6, where the manner of blowing is specified, so as to indicate the different signals intended.

[5] II Kings xii, 13; II Chronicles xiii, 12, 14.

[6] Psalms xcviii, 6; Ezra iii, 10; II Kings xi, 14; II Chronicles xxiii, 13.

[7] Athenæus IV, p. 175.

[8] *Idem*, p. 185.

[9] Pollux, IV, 84.

[10] I Kings i, 40.

[11] I Samuel x, 5; Isaiah xxx, 29; Revelation xviii, 22.

[12] Matthew ix, 23.

[13] Talmud Erachin, 10a; Tacitus, Historiæ, v, 5.

phony) in Daniel iii, 5, 10, 15. The Authorized and Revised Versions give dulcimer, though the margin of the latter gives bagpipe. Engel[1] says that the Italian peasantry still call a bagpipe *Zampogna*, and according to the last edition of Gesenius *Sambonjo* and *Zampogna* have also persisted in Asia Minor. *Sumponiah* is supposed by some to be a translation of the Hebrew *ʿugab*, though the latter possibly represents pan pipes.

(5) Reeds or pan pipes, Cairo, Egypt. (See plate 2, fig. 1.) The reeds now called in Egypt *safafir* are probably the Hebrew *ʿugab*.[2] They were known to the Greeks under the name of *syrinx* (Latin *fistula*). There was shown in addition to the Egyptian instrument an Assyrian bas-relief representing a flute player. (See plate 3.)

(6) Bagpipe, represented by an instrument from Tunis, Africa, where it is called *zaida*, possibly Aramaic *Sumponiah* mentioned in Daniel iii, 5, 10. (See plate 6.) The bagpipe originated in the East, and was known to the Greeks and Romans.[3] It was popular throughout the middle ages and is still used in many eastern countries and among the country people of Poland, Italy, the south of France, and in Scotland and Ireland.

III.—STRINGED INSTRUMENTS.

(1) Harp.—The Hebrew word *Kinnor*, which is adopted for harp, occurs in the opening chapters of the Bible.[4] It was the especial instrument of David.[5] Later it was one of the important instruments of the Temple orchestra,[6] being one of the instruments most frequently mentioned in the Bible.[7] To judge from representations on Egyptian monuments and Jewish coins of the second century B. C., the *Kinnor* resembled the Greek *Kithara* more than the modern trigonal harp, a theory corroborated by the fact that the Hebrew *Kinnor* is usually rendered *Kithara* (κιθάρα) by the Septuagint, the oldest Greek version of the Old Testament. Jewish coins show lyres with three, five, and six strings.

A similar instrument was also in use among the Assyrians. In its smaller form it could easily be carried about in processions, as the representations on the monuments, both Egyptian and Assyrian, show. (A photograph of a relief of an Assyrian harp player was exhibited. See plate 7.)

(2) Psaltery or Dulcimer (Hebrew, *Nebel*). (See plate 8.) Next to the harp (*kinnor*) and mostly in conjunction with it, the psaltery is

[1] Musical Instruments, p. 23.

[2] Genesis iv, 21.

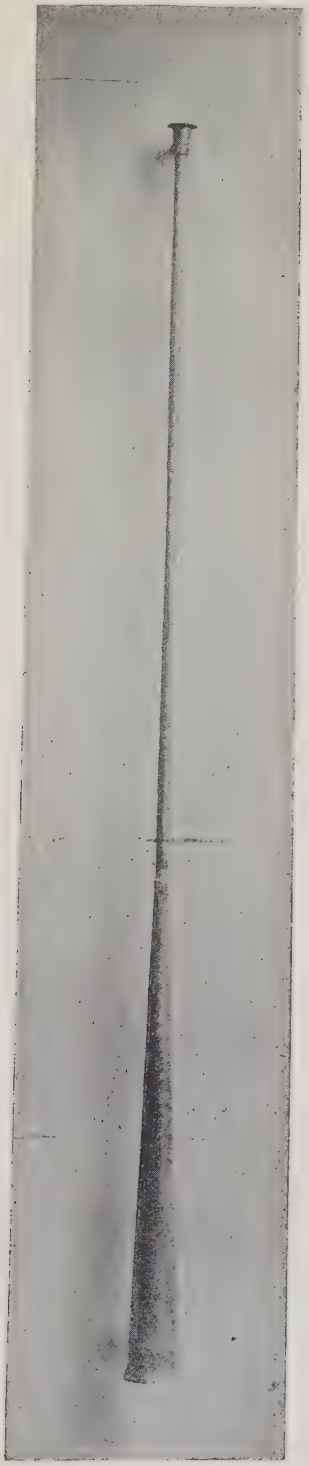
[3] It was introduced in Rome in the imperial period under the name of *tibia utricularis* or *chorus* and soon obtained great popularity. (Compare Seneca, Epistol, 76.)

[4] Genesis iv, 21.

[5] I Samuel xvi, 23.

[6] I Chronicles xv, 16; II Chronicles xxix, 25.

[7] Genesis xxxi, 27: Isaiah xxiii, 16; Psalms xxxiii, 2; xliii, 4; Job xxi, 12.



TRUMPET.

Morocco, Africa.

Cat. No. 95289, U.S.N.M. Collected by Dr. Talcott Williams.

ASSYRIAN BAS-RELIEF REPRESENTING A FLUTE PLAYER.
Original in Royal Museum, Berlin.
Cat. No. 130213, U.S.N.M.

ARCH OF TITUS AT ROME, SHOWING TWO TRUMPETS FROM THE TEMPLE OF JERUSALEM.

BAGPIPE.

Tunis, Africa.

Cat. No. 95141, U.S.N.M. Collected by Dr. Cyrus Adler.

ASSYRIAN BAS-RELIEF SHOWING HARP PLAYERS.
Original in British Museum.
Collection U. S. National Museum.

HITTITE LUTE PLAYER.
Senjirli, Asia Minor.
Original in Royal Museum, Berlin.
Cat. No. 155035, U.S.N.M.

most frequently mentioned in the Bible. It is likely that the psaltery resembled what is now known in the East as the tamboora or guitar, an instrument which also figures largely on the Egyptian and Assyrian monuments. In its present shape the psaltery is thus described: "In its most complete and perfect form this instrument is 3 feet 9 inches long, has ten strings of fine wire and forty-seven stops. It is played with a plectrum, and is often inlaid with mother-of-pearl and valuable woods. It is oftener, however, of smaller size and less costly materials."[1] Others assume that the *nebel* resembled the harp-shaped instruments seen on Assyrian monuments. In Psalms xxxiii, 2, *nebel asor*, the "*nebel* of ten," probably ten strings, is mentioned. This would curiously agree in detail with the instrument described above. Engel[2] assumes that there is an independent instrument called the *asor*, which is supported by Psalms xcii, 3, "with an instrument of ten strings, and with the psaltery."[3]

PRECIOUS STONES OF THE BIBLE.

The use of precious stones for ornament, as well as with engraving for signets and the like, was well known to all of the Mediterranean peoples, and quite a goodly number of them are mentioned in the Bible.

The engraving of signets upon hard stones was practiced at an early period. The Israelites may have acquired the art from the Egyptians, who are known to have made use of the lapidary's wheel and emery powder, and are supposed to have been acquainted with the diamond and the method of engraving other stones by means of it. The Assyrians and Babylonians were very skillful in engraving on gems, many of which have been found in the ruins of their palaces and cities.

The sources for the names of gems in the Bible are three almost identical lists:

I. The description of the High Priest's "breastplate of judgment" (*hoshen ha-mishpat*), in which were placed, in gold setting, four rows of precious stones, three in each row, engraved with the names of the twelve tribes of Israel.[4]

II. The description of the ornaments of the King of Tyre.[5]

III. The description of the foundation of the Heavenly City.[6]

In many instances the exact equivalent of the biblical names of precious stones is uncertain in the nomenclature of modern mineralogy. In the following tables are given, alongside of the original and the Septuagint, the meaning adopted by most authorities, the rendering

[1] Van Lennep, Bible Lands, p. 612.

[2] Musical Instruments, p. 19.

[3] Compare on the subject of music of the ancient Hebrews the excellent appendix to the Psalms in Prof. Paul Haupt's Polychrome Edition of the Bible, pp. 217–234. 236, 237.

[4] Exodus xxviii, 17–20.

[5] Ezekiel xxviii, 13.

[6] Revelations xxi, 19, 20.

of the Revised Version, both in the text and margin, being added in parentheses.

Besides the stones enumerated in these lists, there are probably mentioned, first, diamond, Hebrew *shamir*, for which the following passages serve as illustrations: Jeremiah xvii, 1: "The sin of Judah is written with a pen of iron, and with the point of a diamond;" Ezekiel iii, 9: "As an adamant harder than flint have I made thy forehead;" Zechariah vii, 12: "Yea, they made their hearts as an adamant stone, lest they should hear the law;" second, amber (margin of Revised Version, following the Septuagint and Vulgate, electrum), Hebrew, *hashmal*, Ezekiel i, 4, which however, may represent some metallic compound, possibly the mixture of gold and silver, now called electrum; and, third, crystal, Hebrew *qerah* and *gabish*, properly ice, according to the view of the ancients, that crystal was ice hardened by intense cold.[1]

The three lists of precious stones in the Bible.

I. EXODUS XXVIII, 17–20.

1. *Odem* (*sardion*), carnelian (sardius, ruby).	2. *Pitdah* (*topazion*), topaz or peridot.	3. *Bareketh* (*smaragdos*), smaragd or emerald (carbuncle emerald).
4. *Nofek* (*anthrax*), carbuncle, probably the Indian ruby (emerald, carbuncle).	5. *Sappir* (*sapfeiros*), sapphire or lapis lazuli (sapphire).	6. *Yahalom* (*iaspis*), onyx, a kind of chalcedon (diamond, sardonyx).
7. *Leshem** (*ligyrion*), jacinth, others, sapphire (jacinth, amber).	8. *Shebo* (*achates*), agate.	9. *Achlamah** (*amethystos*), amethyst.
10. *Tarshish* (*chrysolithos*), chrysolite, others, topaz, (beryl, chalcedony).	11. *Shoham* (*beryllion*), beryl (onyx, beryl).	12. *Yashpeh* (*onychion*), jasper.

II. EZEKIEL XXVIII, 13.

1. *Odem.*	2. *Pitdah.*	3. *Yahalom.*
4. *Tarshish.*	5. *Shoham.*	6. *Yashpeh.*
7. *Sappir.*	8. *Nofek.*	9. *Bareketh.*

III. REVELATIONS XXI, 19, 20.

1. *Iaspis*, jasper.	2. *Sapfeiros*, sapphire or lapis lazuli.	3. *Chalkedon*, chalcedony.
4. *Smaragdos*, smaragd (emerald).	5. *Sardonyx*, sardonyx.	6. *Sardios*, sardius.
7. *Chrysolithos*, chrysolite.	8. *Beryllos*, beryl.	9. *Topazion*, topaz.
10. *Chrysoprasos*, chrysoprase.	11. *Hyakinthos*, jacinth (margin, sapphire).	12. *Amethystos*, amethyst.

* Dr. Fr. Hommel, in his book, The Ancient Hebrew Tradition as Illustrated by the Monuments New York, 1897, p. 281, compare also p. 291, surmises that *leshem* and *achlamah* are Egyptian loan-words, derived respectively from the Egyptian names *neshem* and *ekhnóme*.

[1] Ezekiel i, 22; Job xxviii, 18; Revelations iv, 6.

EXPLANATION OF PLATE 9.

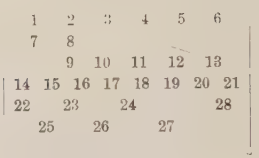


Fig. 1. Shekel.
Fig. 2. Coin of Herod Agrippa II.
Fig. 3. Coins of John Hyrcanus.
Fig. 4. Coin of Alexander Jannæus (*widow's mite*).
Fig. 5. Staters of Antioch.
Fig. 6. Coin of Herod Antipas.
Fig. 7. Coin of Herod Philip.
Fig. 8. Coin of Cæsarea.
Fig. 9. Tetradrachm of Sidon.
Fig. 10. Coins of Damascus.
Fig. 11. Coin of Askelon.
Fig. 12. Denarii.
Figs. 13, 14. Tetradrachms of Tyre.
Fig. 15. Tetradrachm of Alexander the Great.
Fig. 16. Tetradrachm of Babylon.
Fig. 17. Tetradrachm of Seleucus I Nicator.
Fig. 18. Stater of Tarsus.
Fig. 19. Coin of Demetrius Soter.
Fig. 20. Coin of Cyprus.
Fig. 21. Aes of Thessalonica.
Fig. 22. Coin of Thessalonica.
Fig. 23. Tetradrachms of Athens.
Fig. 24. Didrachms of Athens.
Fig. 25. Tetradrachms of Ephesus.
Fig. 26. Hemidrachms of Ephesus.
Fig. 27. Tetradrachms of Macedonia.
Fig. 28. Child's Bank.

COINS OF BIBLE LANDS.

Collection U[illegible] National Museum.

The precious stones exhibited were as follows:

RUBY, a variety of corundum (five specimens).—Ruby is given on the margin of the Revised Version for the Hebrew *odem*, which is also, however, rendered carnelian by some authorities. The Hebrew name indicates reddish stone.[1]

TOPAZ.—Topaz is the probable rendering of Hebrew *pitdah*, mentioned in the book of Job (xxviii, 19) as coming from Ethiopia.

GARNET CARBUNCLE (seven specimens).—Carbuncle is given on the margin of the Revised Version for the Hebrew *nofek* and in the text for the Revised Version for *bareqeth*.[2]

EMERALD.—Given in the text of the Revised Version for the Hebrew *nofek*, and in the margin for Hebrew *bareqeth* and Greek *smaragdos*.

SAPPHIRE, a variety of corundum (four specimens).—Hebrew *sappir* and Greek *sapfeiros* are identical with the English name, which is the same as that in all modern languages. Some, however, assume that these names in the Bible signify lapis lazuli.

SARDONYX, a variety of quartz (two specimens).—Sardonyx is given on the margin of the Revised Version for Hebrew *yahalom*.[2]

DIAMOND (one specimen).—The Hebrew *yahalom* in the High Priest's breastplate, Exodus xxviii, 18, is rendered "diamond" in the English version and by Luther. But the diamond could not have been used in the breastplate, because the Hebrews knew of no means of engraving a name upon it. In all probability, however, the diamond is understood by Hebrew *shamir*, Jeremiah xvii, 1; Ezekiel iii, 9; Zechariah vii, 12, where it is spoken of as an object used for engraving, and of extreme hardness.

WHITE SAPPHIRE ADAMANT, a variety of corundum (two specimens).

JACINTH (three specimens).—Jacinth is assumed by some to be the Hebrew *leshem*.

AGATE, a variety of quartz (three specimens).—Agate is agreed to be the Hebrew *shebo*.

AMETHYST, a variety of quartz (three specimens).—Amethyst renders the Hebrew *ahlamah*. It is so called in Greek because it was thought to be a charm against drunkenness. The Hebrews popularly derived it from *halam*, to dream, and supposed that it brought pleasant dreams. Other etymologies have, however, been proposed.

BERYL (two specimens).—Beryl is given for the Hebrew *tarshish*, Revised Version text, and *shoham*, Revised Version margin.

CHALCEDONY, a variety of quartz (six specimens).—One of the stones enumerated in the description of the foundation of the Heavenly City (Revelation xxi, 19). Some assume that *tarshish* in the High Priest's breastplate (Exodus xxviii, 20), means chalcedony. (So the Revised Version margin.) Topaz is also given for this stone.

[1] Where no references are given to these names, it may be assumed that they occur in the passages in Exodus, Ezekiel, and Revelations mentioned above.

[2] Exodus xxviii, 18.

ONYX, a variety of quartz.—Given in the Revised Version of the Hebrew *shoham*. *Shohams* set in gold were put on each of the two shoulderstraps of the *ephod* of the High Priest, and the two together had engraved the names of the tribes of Israel (Exodus xxviii, 12). It is mentioned in Genesis ii, 12, in the account of the Garden of Eden.

JASPER, a variety of quartz (two specimens).—This is the accepted meaning of the Hebrew name *yashpeh*, the words being probably identical in origin.

CARNELIAN, a variety of quartz (three specimens).—Possibly Hebrew *odem* of the High Priest's breastplate (Exodus xxviii, 17), and the *sardius* in Revelation iv, 3; xxi, 20.

CHRYSOLITE (two specimens).—Possibly Hebrew *tarshish*.

AMBER (two specimens).—Probably the Hebrew *hashmal* (Ezekiel i, 4). Some suppose that amber is understood by Hebrew *leshem*.

CHRYSOPRASE, a variety of quartz (four specimens).—Enumerated in the description of the foundation of the Heavenly City (Revelation xxi, 20).

LAPIS LAZULI (Persia).—Some authorities suppose that by *sappir* not sapphire but lapis lazuli is meant.

PEARL.—It is supposed by some that the pearl is meant by the Hebrew *peninim*, which is often employed in the Old Testament as a figure of something valuable and precious.[1]

In addition to the gems there was also exhibited a silver breastplate, used as an ornament for the manuscript copy of the Pentateuch (*Torah*) employed in the synagogue, which represented the twelve stones which were set in the breastplate of the High Priest[2] with the names of the twelve tribes of Israel underneath them.

A SELECTION OF THE COINS OF BIBLE LANDS.

(Plate 9.)

Coined money did not circulate among the Israelites previous to their return from the Babylonian captivity, and indeed there is no evidence that it did then. It is unquestioned, however, that specific weights of gold and silver were well recognized in commercial transactions from a very early period.[3] This was principally silver in the form of bars—ingots—translated in the authorized and revised versions

[1] Proverbs iii, 15; xxxi, 10; Job xxviii, 18. Jesus uses the pearl for the same purpose (Matthew vii, 6; xiii, 45): "Give not that which is holy unto the dogs, neither cast your pearls before swine, lest haply they trample them under their feet, and turn and rend you." Again, "The Kingdom of Heaven is like unto a man that is a merchant seeking goodly pearls; and having found one of great price, he went and sold all that he had and bought it."

[2] Exodus xxviii.

[3] Compare the first chapters in Ernest Babelon's Les origines de la monnaie considérés au point de vue économique et historique, Paris, 1897.

"wedge" (in the original "tongue," Joshua vii, 21),[1] disks (*kikkar*), or rings (often represented on Egyptian monuments), which undoubtedly had a fixed valuation and weight. Generally the metal was weighed on scales to determine its value. Thus the name of the piece of money most frequently occurring in the Bible, *shekel*, properly denotes "weight" (from *shaqal*, "to weigh"), and to this day it is usual in the East to examine and test carefully by weight all coins received.

After the exile we find mentioned *adarkon* and *darkemon*,[2] apparently as weights for money, which are usually identified in name with the Persian gold daric. Upon the overthrow of the Persian monarchy Greek coins of the denominations of talents and drachms probably began to circulate in Palestine.

While some attribute the first coinage of the shekel to Ezra, the earliest native Jewish coins known are shekels and half shekels of silver, and one-sixth skekel of bronze, struck by Simon Maccabæus[3] about 146 B. C. The succeeding Maccabæan or Hasmonæan princes down to 37 B. C. struck small bronze coins with Hebrew or Hebrew and Greek inscriptions. The Idumæan or Herodian princes coined bronze money bearing their names in Greek characters. At the same time the Roman procurators of Judæa (from 6 B. C.) also struck coins with Greek inscriptions. The last coins struck by the Jews were those during the revolt under Bar-Cochba (132 A. D.). Greek and Roman money was current in Palestine in addition to the native Hebrew coins, as seen from the New Testament.[4]

Money mentioned in the Bible.

I. HEBREW MONEY.

Talent (*kikkar*).	Mina (*maneh*).	Shekel.	One-half shekel (*beka*).	One-fourth shekel (*reba*).	One-twentieth shekel (*gerah*).	United States currency, about—
1=	60=	3,000=	6,000=	12,000=	60,000=	$1,920.00
	1=	50=	100=	200=	1,000=	32.00
		1=	2=	4=	20=	.64
			1=	2=	10=	.32
				1=	5=	.16
					1=	.03⅓

II. PERSIAN MONEY.

Gold daric, weighing 130 grains (*adarkon, darkemon*).	Silver daric, about—	United States currency, about—
1=	10=	$5.50
	1=	.52

[1] Dr. Schliemann discovered in the second layer of Troy (the modern Hissarlic) six more or less tongue-shaped silver plaques, which are now preserved in the Royal Museum of Berlin and which are assumed to have served as money; compare Dr. A. Götze, Die Trojanischen Silberbarren der Schliemann-Sammlung, in Globus, LXXI, No. 14.

[2] Ezra viii, 27; Nehemiah vii, 72.

[3] I Maccabees xv, 6.

[4] Compare William C. Prime, Money of the Bible, in the Sunday School Times, 1898, Nos. 15, 17.

Money mentioned in the Bible—Continued.

III. GREEK AND ROMAN MONEY.

Stater.	Tetradrachm.	Shekel.	Didrachm.	Drachm ("piece of silver").	United States currency, about—
1=	1=	1=	2=	4=	$0.64
			1=	2=	.32
				1=	.16

Denarius ("pence").	Assarion (As, "farthing").	Quadrant ("farthing").	Lepton ("widow's mite").	United States currency, about—
1=	10=	40=	80=	$0.16
	1=	4=	8=	.01
		1=	2=	.00½
			1=	.00½

The following specimens were shown as representing the ancient coinage of places mentioned in the Bible:

SHEKEL.—Made of silver and attributed to Simon Maccabaeus (141–136 B. C.), to whom Antiochus VII Sidetes "gave leave to coin money for thy country with thine own stamp."[1] Obverse, a cup representing the pot of manna,[2] with the legend: "Shekel of Israel. Year two;" reverse, the budding rod of Aaron,[3] with the legend: "Jerusalem the Holy." (See plate 9, fig. 1.) The value of the shekel in United States currency was about 64 cents. The average shekel weighs between 200 and 220 grains, Troy weight.

TWO COINS OF JOHN HYRCANUS (136–106 B. C.).—Original of copper. Obverse, "Jochanan, High Priest and Prince of the Jewish Confederation;" reverse, two cornucopias and a poppy head. (See plate 9, fig. 3.)

WIDOW'S MITE.—Coin of Alexander Jannaeus (105–78 B. C.).—Copper (facsimile). Obverse, "Jonathan the High Priest and the Confederation of the Jews," within a wreath of olive; reverse, two cornucopias and a poppy head. (See plate 9, fig. 4.) It is assumed that this or a similar coin is referred to by the term "widow's mite" in Mark xii, 42. It is true that in the original it bears the Greek name *lepton* λεπτόν, Latin *minutum*, but a Jewish coin must be assumed here, none other being permitted within the temple precincts. The mite was the smallest current Jewish coin in the times of Jesus, and was also the smallest temple contribution legally admissible. Its value in the United States currency was about one-eighth of a cent.

COIN OF HEROD ANTIPAS.—Bronze. Obverse (in Greek characters), "Herod Tetrarch," with a palm branch; reverse, "Tiberias," within a wreath. (See plate 9, fig. 6.) Herod Antipas, Tetrarch of Galilee and Peraea, A. D. 4–39, is often mentioned in the New Testament.[4] It was he who beheaded John the Baptist, and to him was Jesus sent for examination, by Pilate.[5] In honor of the Emperor Tiberias he founded the city of Tiberias, on the western shore of the Sea of Gennesareth, where the coin was struck.

[1] I Maccabees xv, 6.
[2] Exodus xvi, 33.
[3] Numbers xvii, 8.
[4] Matthew xiv, 1–3; Luke iii, 1, 19, etc.
[5] Luke xxiii, 7.

COIN OF HEROD PHILIP II (died A. D. 34).—Struck at Cæsarea Philippi in honor of the Eighth Roman Legion. Copper. Obverse, "Herod Philip," with his portrait; reverse, the standards of the Legion. (See plate 9, fig. 7.) Herod Philip is mentioned[1] as Tetrarch of Iturea; Cæsarea Philippi was often visited by Jesus.[2] It is now a small village called Banijas, near Mount Hermon.

COIN OF AGRIPPA II (last Jewish King).—Bronze. Obverse, name and head of the Emperor; reverse, "Money of Agrippa, struck at Neronias" (Cæsarea Philippi). (See plate 9, fig. 2.) Herod Agrippa II was the last Jewish King, 48–100 A. D.[3]

His long reign was coincident with that of the Roman emperors Claudius, Nero, Galba, Otho, Vitelius, Vespasian, Titus, Domitan, Nerva, Trajan, and his coins are therefore found bearing the effigies of several emperors. He is mentioned[4] as having an interview with the Apostle Paul in the presence of the Roman Governor Festus at Cæsarea.

DENARIUS, OR ROMAN TRIBUTE PENNY.—Silver (two specimens). Obverse, "Tiberius Cæsar," son of deified Agustus (Emperor 14–37 A. D.); reverse, "Pontifex Maximus" (Chief Priest). It contained 60 grains Troy of silver, and its value was about 16 cents. (See plate 9, fig. 12.) The denarius was the tribute money that the Jews had to pay to the Romans, and it is very likely that a variety of this coin was shown Jesus with the question "Is it lawful to give tribute unto Cæsar or not?"[5] The denarius seems to have been the ordinary day's wages of the Palestinian peasantry.[6] It is mentioned eleven times in the Gospels[7] and once in the Revelation (vi, 6). The translation in the English versions, penny, is misleading.

STATER.—Antioch. Silver (facsimile, two specimens). Obverse, "(Money) of Cæsar Augustus" (first Roman Emperor, 29 B. C. to 14 A. D.), with head of the Emperor; reverse, Tyche, as genius of the city of Antioch, with her foot on the river god Orontes, and the words, "Thirtieth year of the victory" (i. e., Actium). (See plate 9, fig. 5.) The stater, about equal in value to the shekel, is mentioned (Revised Version, "shekel"; margin, "stater") as the coin which would be found by Peter in the mouth of the fish, sufficient to pay the Temple tribute, which was half a shekel, for Jesus and himself.[8]

COIN OF CÆSAREA.—Bronze. Obverse, head of Agustus Cæsar. (See plate 9, fig. 8.) Cæsarea, founded by Herod I, is frequently mentioned in the Acts. It was the scene of the conversion of the centurion

[1] Luke iii, 1.
[2] Matthew xvi, 13; Mark viii, 27.
[3] Graetz, History of the Jews, pp. 50–93.
[4] Acts xxvi, 2, 28.
[5] Matthew xxii, 17.
[6] *Idem*, xx, 2.
[7] *Idem*, xviii, 28; xx, 2, 9, 10, 13; xxii, 17; Mark vi, 37; xii, 15; xiv, 5; Luke vii, 41; x, 35; xx, 24; John vi, 7; xii, 5.
[8] *Idem*, xvii, 27.

Cornelius (x); Philip preached the Gospel here (xxi, 8); Paul was imprisoned here two years before he was sent to Rome (xxiv–xxvi). It was the residence of the Roman governors, and here the Jewish war against Rome broke out.

TETRADRACHM OF SIDON.—Silver. Obverse, head of the city; reverse, "(Money of the Sidonians) Holy and inviolable," with the figure of Astarte. (See plate 9, fig. 9.) The value of a tetradrachm was about the same as of the shekel, or 64 cents. Sidon, the oldest city of Phenicia, is often mentioned in the Bible. It is at present represented by the town of Saida, with about 15,000 inhabitants.

TETRADRACHMS OF TYRE.—Silver. Obverse; Head of Hercules as Baal (Lord) of the city. (See plate 9, figs. 13, 14.) Tyre, next to Sidon the oldest and most important city of Phenicia, is often referred to in the Bible. During the period of David and Solomon friendly relations were entertained between Tyre and Israel.[1] The coast of Tyre was visited by Jesus,[2] and Paul landed at Tyre on one of his missionary voyages.[3] The modern Çur is an unimportant town, with about 5,000 inhabitants.

COIN OF ASHKELON.—Bronze. Struck by order of Emperor Alexander Severus, about A. D. 228. (See plate 9, figs. 11.)

Ascalon, or Ashkelon, was one of the five cities of the Philistines, 30 miles southwest of Jerusalem;[4] it was the center of the worship of Derceto, the supposed female counterpart of Dagon. It is now represented by the village of Askalan.

COINS OF THE CITY OF DAMASCUS.—Copper (two specimens). (See plate 9, fig. 10.) Damascus, the ancient capital of Syria, is mentioned as early as in the times of Abraham.[5] Later, it frequently came in contact with Israel.[6] In the New Testament it is especially known from the history of the Apostle Paul.[7]

TETRADRACHM OF THE CITY OF BABYLON.—Silver. Struck by Mazaios, governor under Alexander the Great, 331–328 B. C. (See plate 9, fig. 16.)

TETRADRACHM OF ALEXANDER THE GREAT (336–323 B. C.).—Silver. Obverse, head of the king; reverse, Zeus (Jupiter) seated holding the eagle. (See plate 9, fig. 15.)

Alexander, King of Macedonia and the famous conqueror, is mentioned by name in I Maccabees vi, 2. It is also assumed that he is typified under the emblem of the "he-goat" in Daniel viii, 5, and that his empire is meant by the "fourth monarchy" depicted in Daniel ii, 40 and vii, 7, 23f.

TETRADRACHM OF SELEUCUS I NICATOR, KING OF SYRIA, 312–280 B. C.—Silver. Obverse, head of Seleucus; reverse, figure of Jupiter.

[1] I Kings, v.
[2] Matthew xv, 21; Mark vii, 24.
[3] Acts xxi, 3.
[4] Joshua xiii, 3; 1 Samuel vi, 17.
[5] Genesis xiv, 15; xv, 2.
[6] II Samuel viii, 6; II Kings xvi, 9, etc.
[7] Acts ix; xxii, 6.

(See plate 9, fig. 17.) The city of Seleucia, the principal port of Antioch, from which Paul and Barnabas set out for Cyprus,[1] was named after Seleucus I.

COIN OF DEMETRIUS SOTER.—Obverse, head of Demetrius; reverse, "King Demetrius Soter," with seated female figure. (See plate 9, fig. 19.) Demetrius Soter, King of Syria 162–150 B. C., waged war against the Maccabees and is often mentioned in the books of the Maccabees.[2]

STATER OF TARSUS.—Silver. 380–360 B. C. Obverse, Baal enthroned within a circle of turrets; reverse, Satrap Tarcamos seated, holding one arrow. (See plate 9, fig. 18.) Tarsus, the ancient capital of Cilicia, Asia Minor, was the home of the Apostle Paul.[3] It is still a city of about 10,000 inhabitants. It is now accessible from Alexandretta by rail.

COIN OF CYPRUS.—Bronze. Struck under Emperor Claudius (A. D. 41–54) and the Proconsul Sergius Paulus. (See plate 9, fig. 20.) Cyprus, one of the largest islands in the Mediterranean, was the birthplace of Barnabas,[4] and often visited by Paul while Sergius was its proconsul.[5] In the Old Testament it is referred to by the name of Kittim, which name is, however, also used in some passages in a wider sense for the Greek coasts and islands of the Mediterranean.

TETRADRACHMS OF EPHESUS.—Silver. Struck 140 B. C. (two specimens). (See plate 9, fig. 25.) Ephesus, in ancient time one of the most important cities in Asia Minor, was especially celebrated for its Temple of Diana.[6] It was the place of residence of Paul,[7] of Timothy,[8] and of the Apostle John, who probably died there. Ephesus was one of the seven churches referred to in the Apocalypse.[9] It was also the seat of the third General Council (A. D. 431) and of the "Robber Synod" (A. D. 449). Numerous ruins are still to be seen there.

HEMIDRACHMS OF EPHESUS.—Silver. Struck 200 B. C. Obverse, Bee; reverse, Deer (two specimens). (See plate 9, fig. 26.)

AES (= AS) OF THESSALONICA).—Copper. Struck 88 B. C. Obverse, head of Janus; reverse, Dioscuri. (See plate 9, fig. 21.) The *as* or *assarius*, in the Greek New Testament ἀσσάριον (assarion), in the English version "farthing," was the original Roman coin, and was at one time the unit in Roman numeration both of weight and currency. The Greeks adopted the name of the coin and used it upon their autonomous coins. The *as* of the New Testament was of the value of one-sixteenth of a denarius and nearly the size of an English half-penny. It is mentioned in Matthew x, 29 and 30: "Are not two sparrows sold for a farthing, and one of them shall not fall on the ground

[1] Acts xiii, 4.
[2] I Maccabees viii, 31; x, 1, etc.
[3] Acts ix, 11, 30; xi, 25; xxii, 3.
[4] *Idem*, iv, 36.
[5] *Idem*, xiii, 4.
[6] Acts xix, 35.
[8] *Idem*, xix.
[7] I Timothy i, 3.
[9] Apocalypse ii, 4.

without your Father; but the very hairs of your head are all numbered."[1] In Matthew v, 26, the last "farthing" is referred to, and in Mark xii, 42, we read "two mites, which make a farthing." The Greek word is κοδράντης (*Kodrantes*, Latin *quadrans*), which was one-fourth of an *as*. Thessalonica, formerly the capital of Macedonia, where the coin was struck, is the modern Salonica. Two Epistles of Paul are addressed to the Christians of this place.

COIN OF THESSALONICA.—Copper. Struck 158 B. C. Obverse, head of City of Nymph; reverse, Galley. (See plate 9, fig. 22.)

TETRADRACHM OF MACEDONIA.—Silver. Struck between 156 and 146 B. C. Obverse, head of Minerva upon a Macedonian shield; reverse, Club of Hercules. (See plate 9, fig. 27.) Macedonia is often mentioned in the New Testament. Paul visited this province on his second and third missionary voyages and founded congregations in several of its cities.[2]

DIDRACHMS OF ATHENS.—Silver (two specimens) (470 to 230 B. C.). Obverse, head of Athene (Minerva); reverse, Owl. (See plate 9, fig. 24.) Athens, the former capital of Attica and the modern capital of Greece, was visited by Paul, where he delivered the discourse on the Areopagus.[3]

TETRADRACHMS OF ATHENS.—Silver (470 to 230 B. C.). Obverse, head of Athene (Minerva); reverse, Owl (the bird sacred to Athene) (two specimens). (See plate 9, fig. 23.)

CHILD'S BANK.—Pottery. Excavated at Ostia (seaport of ancient Rome), 1886, by Dr. Thomas Wilson. (See plate 9, fig. 28.)

When found the bank consisted of a single piece of pottery. In the top was a slit through which the money was dropped. It contained 145 silver coins of the Roman Consular or Familia series. As these coins were issued from 200 to 19 B. C., and none of a later date were in the find, it is to be presumed that the bank was buried a short time before the Christian era. The silver denarii in the bank are part of the original lot found with the bank.

DRESS, ORNAMENTS, AND HOUSEHOLD UTENSILS.

The fashion of dress and ornament, as well as the form of household utensils, are, it may be assumed, in the "unchanging East" essentially the same at the present day as in Bible times, and the collection shown of objects of modern life and industry in the Orient explain or illustrate many allusions in the Scriptures.

The objects were as follows:

SHEEPSKIN COAT. (See plate 10.) Skins of animals were the primitive material used for clothing,[4] and pelisses of sheepskin still form an ordinary article of dress in the East. The mantle of the

[1] Luke xii, 6.
[2] Acts xvi and xx.
[3] Acts xvii, 15ff.
[4] Genesis iii, 21.

SHEEPSKIN COAT.

Prophet Elijah[1] was probably the skin of a sheep or some animal with the hair left on, wherefore he is called the "hairy man."[2] It was characteristic of the prophet's office.[3] "Beware of false prophets, which come to you in sheep's clothing, but inwardly are ravening wolves." "And it shall come to pass in that day that the prophets shall be ashamed every one of his vision when he prophesieth; neither shall they wear a hairy mantle to deceive." "The prophet's (Elijah's) dress proclaimed the mountaineer of the Arabian border exactly the same as is worn to-day; the undergarment bound with a broad leather belt, and over it a loose, coarse cloak of sheepskin, with the wool outside, its dark-brown folds floating in the wind as he hurriedly strode along with beard bare and long black locks covering his neck, for he was a Nazarite. The Moslem prophet-dervish, as different from the *mollah* or dervish of the towns as Elijah from a Levite of Jerusalem, exactly copies this dress and habit."[4]

Male costume of Bagdad, Mesopotamia.—The general characteristics of Oriental dress have been much the same in all ages. The representations on monuments correspond in general to the raiment in present use. They are the same loose, flowing robes, which can easily be adapted to various purposes. The garments mentioned in the Bible as generally used are the *Ketoneth* (Greek, χιτών, *chiton;* English versions, "coat"), a kind of shirt worn next to the skin, corresponding to the modern *qamis*. It reached to the knees or ankles and was either sleeveless or provided only with short sleeves. A person wearing the *Ketoneth* alone is described as naked.[5] Over the shirt there was worn during the day the *me'îl* (English versions, "cloak"), which had loose sleeves and was longer than the shirt, answering to the modern *Kaftan*. It was thrown off when the wearer engaged in manual labor. It was fastened by a girdle and the folds thus formed were used as pockets. It was and is sometimes woven in one piece.[6] These garments are referred to by Jesus in Matthew v, 40: "And if any man would go to law with thee and take away thy coat (Greek χιτών, *chiton*), let him have thy cloak (ἱμάτιον, *himation*) also." Over these was worn an outer garment, referred to by the terms *simlah*, *beged*, *kesuth*, and *lebush*. It consisted of a rectangular piece of woolen cloth, something like a Scotch plaid, and answered to the modern *lungi* in Central Asia or the *ab'eih* in Egypt, and varied in size and quality with the means of the wearer. There is no special allusion to headdress (except as an ornamental appendage in the description of the dress of the priests). The ordinary headdress of the Bedouin consists of the *Kuffiyeh*, a square handkerchief, generally of red and yellow cotton, or cotton and silk,

[1] I Kings xix, 13, 19; II Kings ii, 13.
[2] II Kings i, 8.
[3] Matthew vii, 15; Zechariah xiii, 4.
[4] H. B. Tristram, Eastern Customs in Bible Lands, p. 166.
[5] I Samuel xix, 24; Isaiah xx, 2; John, xxi, 7.
[6] John xix, 23. Compare Tristram, Eastern Customs in Bible Lands, p. 156.

folded so that three of the corners hang down over the neck and shoulders, leaving the face exposed, and bound round the head by a cord, and it is probable that in ancient time the head was protected in a similar manner. For the protection of the feet sandals were worn, consisting of leather soles fastened to the foot by means of thongs. Shoes seem to have been worn by women for ornamental purposes.[1]

WOMAN'S COSTUME OF BAGDAD, MESOPOTAMIA.—The costume of women was essentially similar to that of men. There was sufficient difference, however, to mark the sex, and it was strictly forbidden to a woman to wear "that which pertaineth unto a man" and to a man "to put on a woman's garment" *simlah*.[2] The difference, probably, consisted chiefly in the outer garment. That of woman is called *Mitpahath*,[3] *ma'atâfâh*,[4] both designating a kind of wrapper or shawl. There are mentioned besides *ça'if*,[5] probably a garment of light, gauzy material, *radîd*,[6] a similar robe, *pethigil*,[7] explained to denote a wrap of some sort or a girdle.

SYRIAN COAT.—Called in Syriac *Abba*. It consists of red cloth embroidered in white and is worn as an outer garment.

SILVER NECKLACE (Hebrew, *Ănaq*). (See plate 11, fig. 1.) Necklaces, like many other ornaments, were worn by both sexes.[8] They consisted of a single band or chain, or of a series of ornaments, as pearls or pieces of corals, strung together.[9] The custom of wearing a necklace is figuratively referred to in Proverbs i, 9: "For they shall be a chaplet of grace unto thy head and chains about thy neck." Animals ridden by kings were decorated with collars of precious metals,[10] and it is still the custom in the East to decorate riding beasts in this way.

SILVER ANKLETS (Hebrew, *Ăkasîm*). (See plate 11, fig. 4.) Anklets worn by women as ornaments are mentioned in Isaiah iii, 16, 18. From these passages it would seem that the tinkling produced by knocking the anklets against each other was their chief attraction. To increase the sound, pebbles were sometimes inclosed in them. They were also worn by the ancient Egyptians, Greeks, and Romans, and are still general in India and in Africa. They were sometimes connected by the "anklet chains"[11] (Hebrew, *Ce'adah*), which compelled those who wore them to take short, mincing steps.

GOLD NOSE RING (Hebrew, *Nezem*). (See plate 11, fig. 3.) The Hebrew

[1] Ezekiel xvi, 10; Canticles vii, 2. Compare Judith x, 4; xvi, 9.
[2] Deuteronomy xxii, 5.
[3] Ruth iii, 15; Isaiah iii, 22.
[4] Isaiah iii, 22; English versions, "mantle, shawl."
[5] Genesis xxiv, 65; English versions, "veil."
[6] Isaiah iii, 23; Canticles v, 7.
[7] *Idem*, iii, 24.
[8] Genesis xli, 42; Daniel v, 29.
[9] Canticles i, 10; iv, 9.
[10] Judges viii, 26.
[11] They are referred to in Isaiah iii, 20.

EXPLANATION OF PLATE 11.

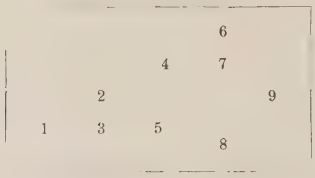


Fig. 1. NECKLACE (*anaq*).
(Cat. No. 151727, U. S. N. M. Bagdad, Turkey. Collected by Rev. Dr. John P. Peters.)

Fig. 2. JEWISH WEDDING RING.
(Cat. No. 154435, U. S. N. M. Philadelphia, Pa. Deposited by Mayer Sulzberger.)

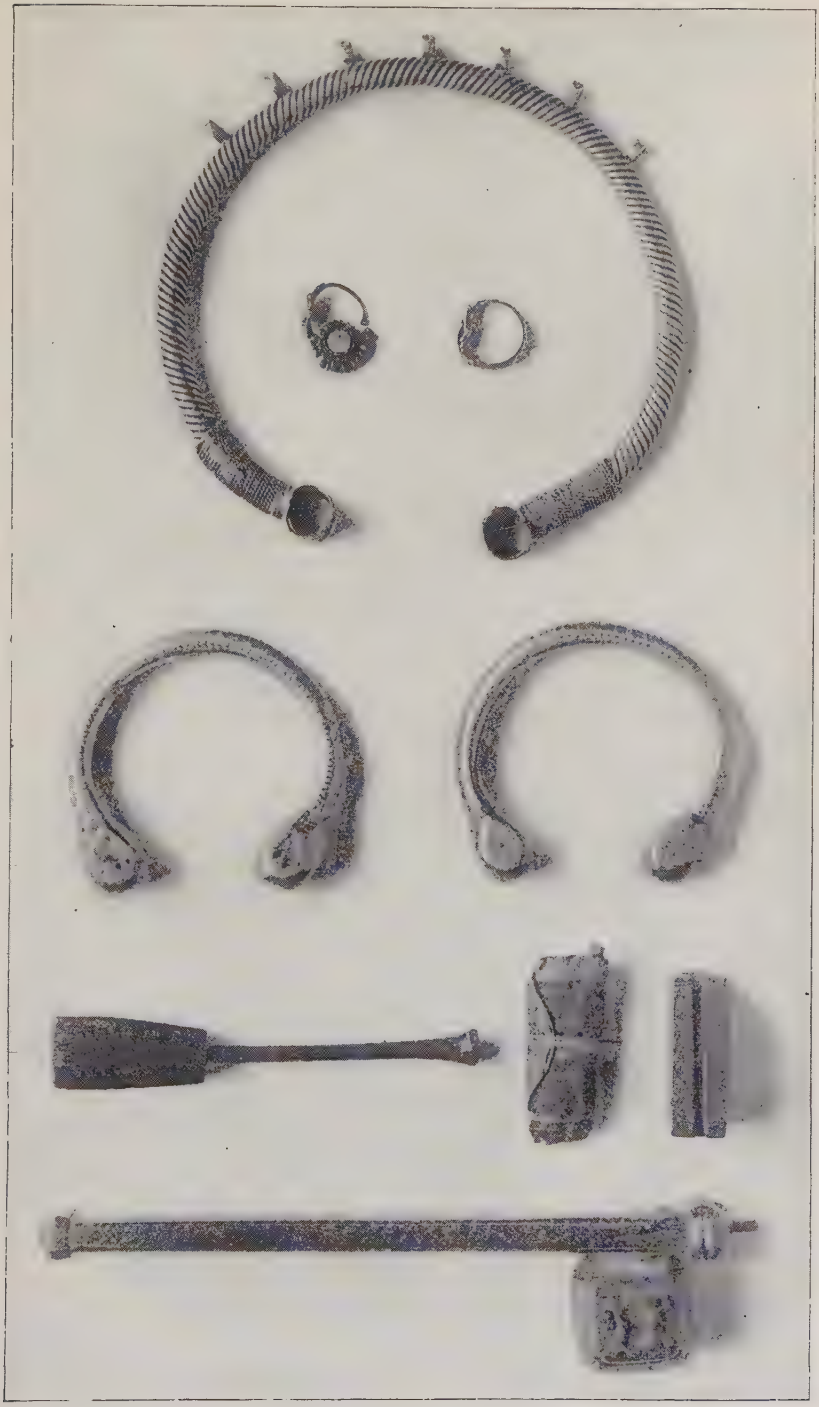
Fig. 3. NOSE RING (*nezem*).
(Cat. No. 151728, U. S. N. M. Bagdad, Turkey. Collected by Rev. Dr. John P. Peters.)

Figs. 4, 5. ANKLETS (*akasim*).
(Cat. No. 151726, U. S. N. M. Bagdad, Turkey. Collected by Rev. Dr. John P. Peters.)

Figs. 6–8. KOHL.
(Cat. No. 151729, U. S. N. M. Bagdad, Turkey. Collected by Rev. Dr. John P. Peters.)

IMPLEMENTS FOR PAINTING THE EYES.
(Cat. Nos. 74562, 74563, U. S. N. M. Egypt. Collected by George W. Samson.)

Fig. 9. SYRIAN INKHORN.
(Cat. No. 74618, U. S. N. M. Palestine. Collected by George W. Samson.)



EASTERN ORNAMENTS.

word *nezem* denotes both an earring and a nose ring.[1] In modern times the rings are often of extraordinary size and frequently reach to the mouth, so that they must be removed in eating. Sometimes the nose and ears are connected by a series of rings interlinked with one another.

KOHL AND ANCIENT AND MODERN IMPLEMENTS USED IN PAINTING THE EYES (Hebrew, *Puch;* Aramean, *Kuhala*). (See plate 11, figs. 6, 8.) The practice of applying pigments to the eyelids and eyebrows in order to enhance the brilliancy of the eyes was common in Bible times,[2] and is still in everyday practice in the East. The pigment, which is a preparation of antimony, is applied to the eyelids by means of a small blunt piece of wood or ivory, which is moistened, dipped in the mixture, and then drawn carefully along the edges of the eye. From the Arabic name kohl comes the term "alcohol," the fineness of the powder suggesting the idea of highly rectified spirits.

MILLSTONES (Hebrew, *Rehaim*) (see plate 12, figs. 1, 2), and a modern photograph showing women grinding corn. (See plate 13.) Millstones are often referred to in the Bible, and they are still used in grinding corn in the same form as in ancient times. They consist of two cylindrical stones. The lower one is firmly planted on the ground and provided with a convex upper surface, on which the concave under surface of the other stone revolves. The upper stone, which is called *rekeb* or "rider," has a hole through its center, into which the grain is dropped, and through which runs a shaft to hold the stone in place. A handle attached to the "rider" enables a person sitting near to turn it around and grind the grain, which is fed with the hand that is free.

Layard[3] describes the grinding of corn by the modern Arabs as follows: "The wandering Arabs have no other means of grinding their corn than by hand mills, which they carry with them wherever they go. They are always worked by the women, for it is considered unworthy of a man to engage in any domestic occupation. * * * The grain is passed through the hole of the pivot, and the flour is collected in a cloth spread under the mill. It is then mixed with water, kneaded in a wooden bowl, and pressed by the hand into round balls ready for baking. During these processes the women are usually seated on the ground. Hence in Isaiah xlvii, 1, 2, the daughter of Babylon is told to sit in the dust and on the ground and "to take the millstones to grind meal." It was forbidden to take the mill or even the upper stone in pledge, as taking "the life" (that is the means of sustaining life).[4] As each day so much grain was ground as was needed, the "voice of the mill" became proverbial.[5]

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[1] Genesis xxiv, 47; Isaiah iii, 21, and Proverbs xi, 32.

[2] Jeremiah iv, 30: "Though thou enlargest thine eyes with paint, in vain dost thou make thyself fair: thy lovers despise thee, they seek thy life." (Compare Ezekiel xxiii, 40; Proverbs vi, 25.)

[3] Layard, Nineveh and Babylon, abridged edition, p. 127.

[4] Deuteronomy xxiv, 6.

[5] Jeremiah xxv, 10.

GOATSKIN WATERBAG (Hebrew, *Nod* and *Hemeth*). (See plate 12, fig. 3.) Skin bottles were commonly used.[1] Jesus employs them in a comparison: "Neither do men put new wine into old wine-skins" (margin, "skins used as bottles").[2] Such bottles are made from the whole skins of animals, generally the goat. After the animal is killed and its feet and head removed the rest of the body is drawn out entire without opening the belly, and after the skin has been tanned the places where the legs were cut off are sewn up and when filled it is tied about the neck. These skin bottles were also used to contain milk, and in them the milk was churned. To the corners of the skin bottle filled with milk cords are tied and the skin is thus suspended from three sticks, which are inclined so as to meet at a point above. A girl sits beneath and moves the suspended bottle to and fro.[3] Skin bottles are also in use in Spain, in the City of Mexico, and by the Eskimos.

BIRD TRAP (Hebrew, *Pah*). (See plate 14, fig. 1.) The most usual method of catching birds was by the trap, which consisted of two parts, a net strained over a frame and a stick or spring (Hebrew *moqesh*) to support it, but so placed that it should give way to the slightest touch. The bird trap is frequently used in comparisons for the ensnaring of the heedless and the weak.[4] "Can a bird fall in a snare upon the earth where no gin is set for him? Shall a snare spring up from the ground and have taken nothing at all?" "Our soul is escaped as a bird out of the snare of the fowlers." "He goeth after her straightway * * * as a bird hasteth to the snare, and knoweth not that it is for his life." "A gin shall take him by the heel and a snare shall lay hold on him." "As the birds that are caught in the snare, even so are the sons of men snared in an evil time, when it falleth suddenly upon them."

SLING (Hebrew, *Qela'*). (See plate 14, fig. 2.) The sling as a weapon of war is first mentioned in the Book of Judges (xx, 16). David killed Goliath with a stone thrown from a sling.[5] The Israelitish army was provided with companies of slingers.[6] The sling was also employed in the wars of the Roman against the Jews.[7] According to the monuments the sling was both an Egyptian and an Assyrian weapon. It consisted of a strip of leather or woven material, wide in the middle to receive the missile, and narrowing at both ends into a rope. Not only were smooth stones used for hurling, but balls made of burnt clay, of lead, and various other hard substances. It is still used by shepherds to drive away wild animals from their herds as in the time of David.

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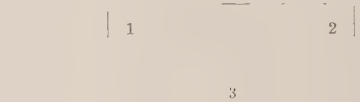
[1] Genesis xxi, 14; Joshua ix, 5.
[2] Matthew ix, 17.
[3] Picturesque Palestine, p. 48.
[4] Amos iii, 5; Psalms cxxiv, 7; Proverbs vii, 23; Job xviii, 9; Ecclesiastes ix, 12.
[5] I Samuel xvii, 40.
[6] II Kings iii, 25.
[7] Josephus, Wars of the Jews, ii, 7, 18; iv, 1, 3.

EXPLANATION OF PLATE 12.



3

Figs. 1, 2. MILLSTONES.
(Cat. No. 151827. U. S. N. M. Bagdad, Turkey. Collected by Rev. Dr. John P. Peters.)

Fig. 3. GOATSKIN WATERBAG.
(Cat. No. 74627, U. S. N. M. Palestine. Collected by George W. Samson.)

MILLSTONES AND GOATSKIN WATERBAG.

WOMEN GRINDING CORN BY HAND MILL.

EXPLANATION OF PLATE 14.

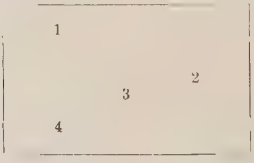
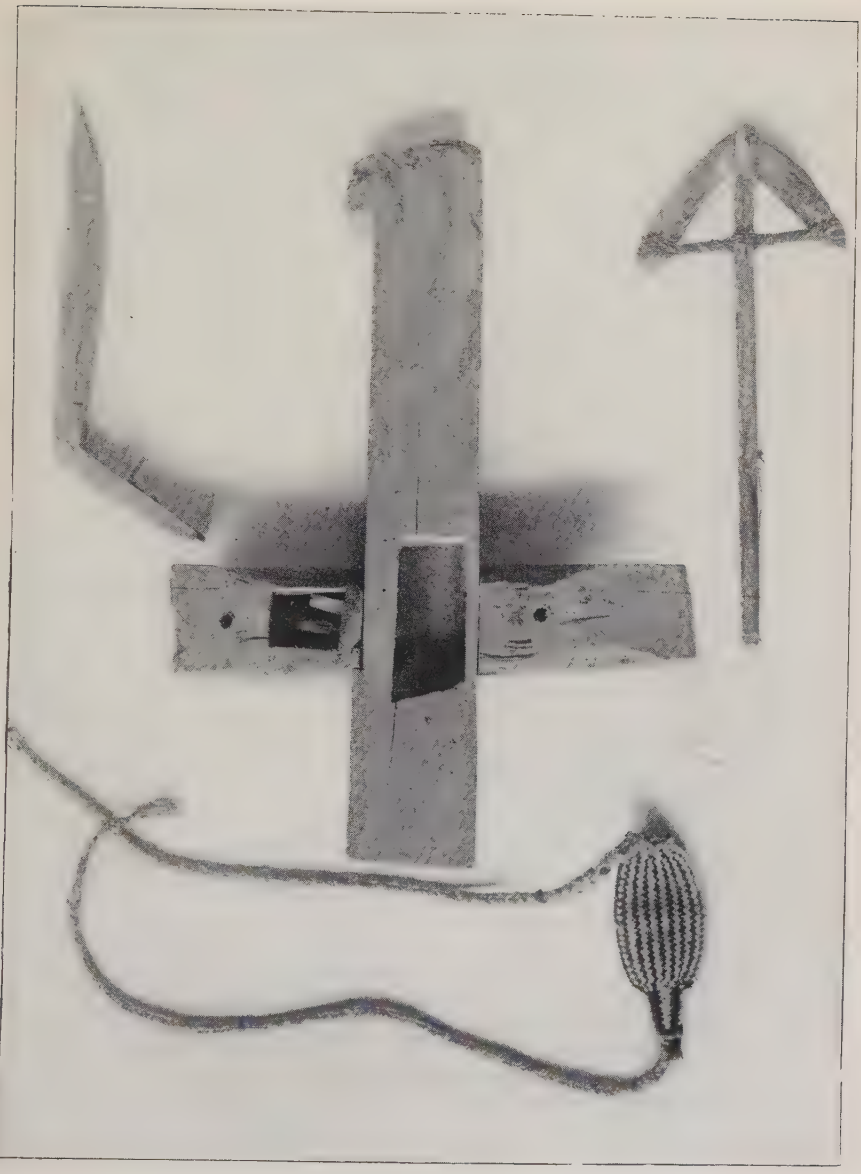


Fig. 1. Bird Trap (*pah*).
(Cat. No. 151842, U. S. N. M. Bagdad, Turkey. Collected by Rev. Dr. John P. Peters.)

Fig. 2. Sling (*qela*).
(Cat. No. 168249, U. S. N. M. Damascus, Syria. Collected by Dr. G. Brown Goode.)

Figs. 3, 4. Door Lock and Key.
(Cat. No. 151840, U. S. N. M. Bagdad, Turkey. Collected by Rev. Dr. John P. Peters.)



BIRD TRAP, SLING, AND DOOR LOCK.

WOODEN DOOR LOCK AND KEY. (See plate 14, fig. 3.) The doors of Eastern houses, which are usually small and low, seem early to have been provided with hinges turning in sockets, and with locks and keys,[1] in whose construction no little ingenuity was displayed. Formerly, as now, it is likely that locks and keys were made both of iron and of wood, according to circumstances. The wooden key now quite generally in use consists of a piece of wood about a foot in length provided at one end with a series of pegs. It is thrust into a little opening at the side of the door and applied to the bolt. This has a corresponding series of holes into which the pegs of the key fit, displacing thereby another set of pegs by which the bolt is held in its place.[2]

SYRIAN INKHORN (Hebrew, *Qeseth ha sofer*). (See plate 11, fig. 9.) The most common writing material among the Hebrews was probably papyrus or dressed skins. This at least must have been the case in the time of Jeremiah, as the expression "roll of a book"[3] points to some pliant material. Ink (Hebrew, *deyo*), which was made of soot, is mentioned in Jeremiah xxxvi, 18. The pen used for writing on papyrus or parchment was no doubt the reed pen still common in the Orient and until recently in southern Europe.[4] The inkhorn is mentioned in Ezekiel ix, 2, as being carried "by the side;" that is, fastened to the girdle of the scribe. It is still carried in this fashion in the Orient. The inkhorn consists of a tube containing reed pens and a receptacle for ink.

JEWISH RELIGIOUS CEREMONIAL.

The next collection was one of objects of Jewish religious ceremonial, which had their origin in and are based upon Biblical ordinances. The following specimens were shown:

MANUSCRIPT COPY OF THE PENTATEUCH, OR FIVE BOOKS OF MOSES IN HEBREW, *Sefer Torah*.—The Pentateuch or law (Hebrew, *Torah*) is considered by the Jews the most important part of the Bible. A section of it is read every Sabbath in the synagogue in the morning service, and shorter portions in the afternoon service, on holidays, fasts, and on Monday and Thursday mornings of every week. This latter usage goes back to the days of the early synagogue when Monday and Thursday were court and market days, and the peasants coming to town to dispose of their produce would attend worship. A manuscript copy is employed, printed copies not being used. When not in use the roll is covered with a cloak and placed upright in an ark or chest.

POINTER (Hebrew, *Yad*, properly "hand").—The pointer is used in the service of the synagogue during the reading of the law to prevent

[1] Judges iii, 23, 25; Canticles v, 5; Nehemiah iii, 3.

[2] Bissel, Biblical Antiquities, p. 23.

[3] Jeremiah xxxvi, 2.

[4] Compare Jeremiah viii, 8; Psalms xlv, 2; III John, 13.

the reader from losing the place. It is usually made in the shape of a hand, hence its Hebrew name.

SILVER BREASTPLATE OF THE TORAH.—On the top are the two tablets engraved with the Ten Commandments, surmounted by the "crown of the law" upheld by two lions, the symbol of the tribe of Judah. Inside the tablets are engraved, on a sliding plate, the names of the various festivals. (See plate 15.) The manuscript copy of the Pentateuch, or the *Sefer Torah*, being the most precious object used in Jewish ceremonies, is, when not in use, covered with a mantle of costly material, sometimes adorned with a breastplate, bells, or crown, and put upright in the "holy ark" (*aron ha-kodesh*).

VEIL OF THE HOLY ARK (*Parocheth*).—Made in Constantinople, Turkey. (See plate 16.) The border of green velvet is embroidered in gold and silver with flowers. The center, of red velvet, has in the four corners, in Hebrew, the names of the four archangels, Raphael, Gabriel, Uriel, and Michael. On the top are the words, "But the Lord is in His holy temple; let all the earth keep silence before Him,"[1] and "I have set the Lord always before me."[2] Below is a burning lamp hanging down by chains, symbolizing the light which emanates from the law of God. On the sides are the words, "This is the gate of the Lord; the righteous shall enter into it."[3] In the Holy Ark (*aron ha-kodesh*) are kept the scrolls of the law, or the Pentateuch, written on parchment, for use in the service of the synagogue. The "Holy Ark" is, therefore, the most important part of the synagogue, and is richly adorned. Whenever it is opened the congregation rises in reverence for the Law of God it contains.

SABBATH LAMP.—Used by the German Jews in their houses. It was manufactured in the eighteenth century in Fellheim, Germany. (See plate 17, fig. 1.) The celebration of the Sabbath is ushered in on its eve (Friday evening) by the housewife lighting candles, reciting the words, "Blessed art Thou, Lord, our God, King of the World, who hath commanded us to light the light of the Sabbath." After that no fire may be handled until the following evening.

KIDDUSH CLOTH.—Silk. Containing in beadwork the tablets of the decalogue in Hebrew, supported by lions. Above are the words, "Remember the Sabbath day, to keep it holy."[4] Before the principal meals of the Sabbath and other feast days the Jews have a special service, including prayers over the wine and bread, which is known as Kiddush, or "sanctification." The head of the family has in front of him a plate containing two loaves of bread, covered by a cloth. The practice of saying a blessing before eating is referred to in I Samuel ix, 13. It no doubt had its origin in the fact that a public meal of any sort was usually preceded by a sacrifice. "Asking the blessing" was

[1] Habakkuk ii, 20.
[2] Psalms xvi, 8.
[3] Psalms cxvii, 20.
[4] Exodus xx, 8.

BREASTPLATE OF THE TORAH.
Constantinople.
Cat. No. 154990, U.S.N.M.

VEIL OF THE HOLY ARK (*Parocheth*).
Constantinople.
Cat. No. 154758, U.S.N.M. Collected by Dr. Cyrus Adler.

EXPLANATION OF PLATE 17.

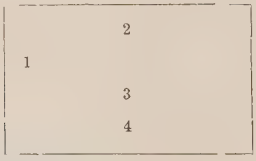
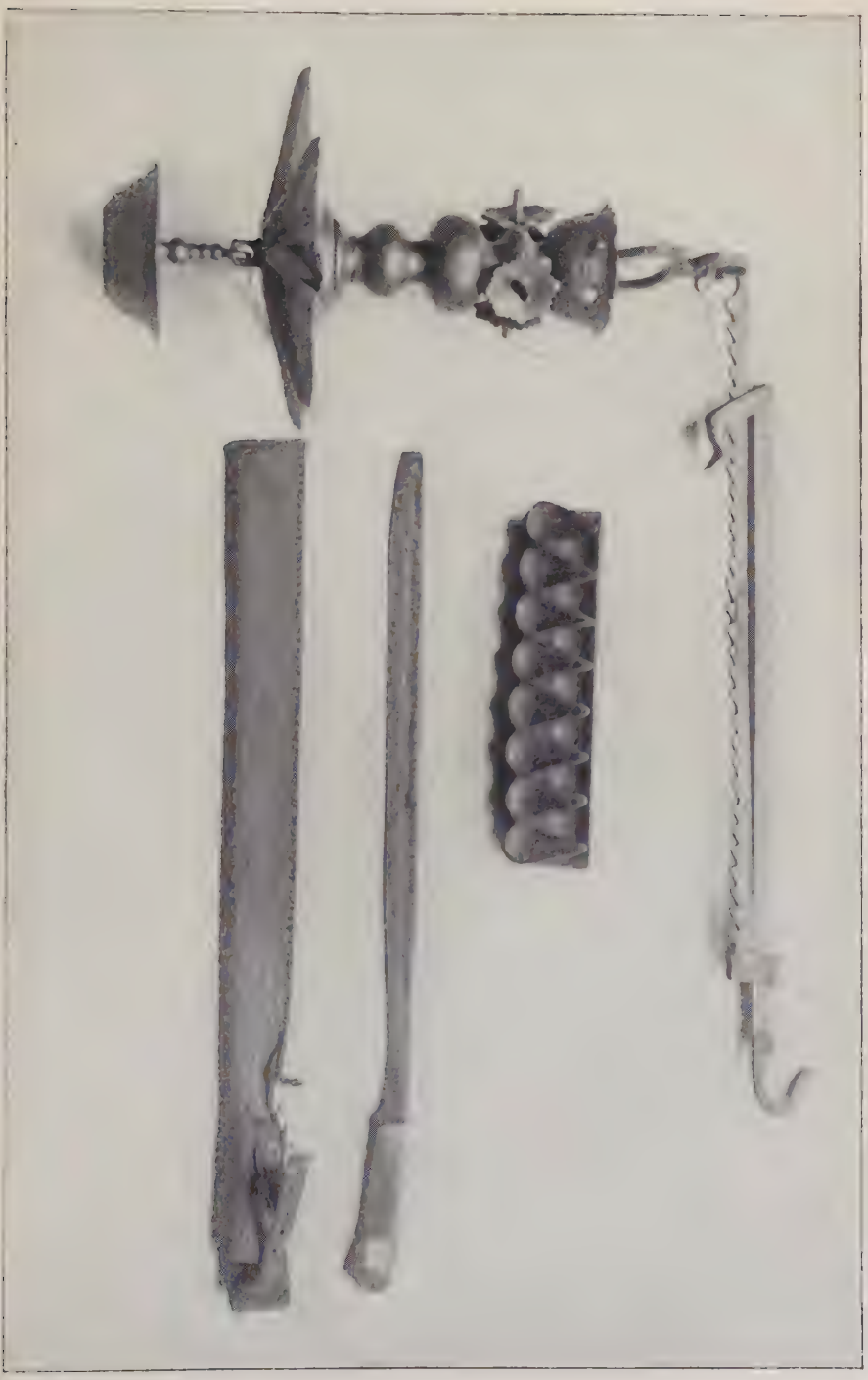


Fig. 1. SABBATH LAMP.
(Cat. No. 130294, U. S. N. M. Germany.)

Fig. 2. HANUKKAH LAMP.
(Cat. No. 130295, U. S. N. M. Germany.)

Figs. 3, 4. SLAUGHTERING KNIFE AND SCABBARD.
(Cat. No. 154619, U. S. N. M. Germany.)



LAMPS AND SLAUGHTERING KNIFE. GERMANY.

common in New Testament times. The later Jews enjoined also that thanks should be returned after the repast.

SILVER SPICE BOX.—Supposed to have been manufactured in Laupheim (Würtemberg), Germany, about 1740. (See plate 18, fig. 4.) This box, filled with spices, is used in the Jewish service known as *Habdalah* (or separation), the service of the conclusion of the Sabbath. There is a tradition that at the beginning of the Sabbath a special angel accompanies the worshiper from the synagogue; this angel remains with him until the conclusion of the Sabbath. The departure of the angel leaves the man faint, and the spices are intended to restore him. The objects used in this service are a cup of wine, the spice box, and a candle. First a blessing is said over the wine, next over the spices, and last over the light. The cup of wine and the spice box are passed around among the members of the household. The candle is then extinguished by having wine poured upon it.

BRASS PLATE, USED AT THE PASSOVER MEAL.—Adorned with animal figures and flowers and containing an Arabic inscription in Hebrew characters. Made in Constantinople (see plate 19). At the Passover meal (*Seder*, properly "order") a large plate is put on the table, which forms, as it were, the altar of the service. On it are placed the various emblematic articles of the ceremony. These are: a piece of roasted meat, usually the bone of a lamb, representing the Passover lamb; a roasted egg, in memory of the festal sacrifice offered in the Temple; bitter herbs (*maror*, usually horse-radish), in commemoration of the "embittering of life" which Israel suffered in Egyptian servitude;[1] *charoseth*, a compound of almonds, apples, and sirup, which has the color of brick-clay, and into which the bitter herbs are dipped before it is partaken of; some green herbs (lettuce or something similar), as the "food of poverty;" and the unleavened bread or *maççoth*, the principal food of the Passover feast, which is the "bread of affliction, for thou camest forth out of the land of Egypt in haste."[2]

OMER TABLET (manuscript). (See plate 20.) Used in the Synagogue for reckoning the period between Passover and Pentecost. The tablet is in Hebrew. It contains the words, "Blessed art thou, O Lord our God, King of the Universe, who has sanctified us with His Commandments and commanded us to count the Omer." Then follows the count (in Hebrew), and below it the words, "May the Lord restore the worship of the temple speedily in our days," and Psalm lxvii. The letters H, S, and D on the left, mean, respectively, Omer (written Homer by the Spanish Jews), week (Sabbath), and day. The figures on the right indicate that it is the forty-seventh day of Omer, i. e., six weeks and five days. The harvest season was formally opened with the ceremony of waving a sheaf of barley in the sanctuary on the second day of the Passover feast, which began on the 15th of Nisan (March-April).

[1] Exodus i, 14. [2] Deuteronomy xvi, 3.

Before this ceremony took place the harvesting of grain was forbidden:[1] "And ye shall eat neither bread, nor parched corn, nor fresh ears, until this selfsame day, until ye have brought the oblation of your God." From that day seven weeks, or forty-nine days, were counted,[2] to the feast of Pentecost; hence its Hebrew name *Hag ha-Shabuoth* "feast of weeks," and the usual English name "Pentecost," which is the πεντηκοστη *pentekoste*, meaning the fiftieth day. It is also called "feast of harvest,"[3] because the grain harvest then approached its close, and "day of first fruits,"[4] because two loaves of bread from the new wheat were offered on that feast.[5] With the destruction of the Temple the ceremony of waving the sheaf in the Sanctuary necessarily fell away, but the counting is still observed and the prayers contained in the tablet form part of the ritual during the time from Passover to Pentecost.

Lulab and Ethrog.—The Lulab and Ethrog, bound up with myrtle and willow branches, are used by the Jews at the feast of Tabernacles, in pursuance of the command in Leviticus xxiii, 40: "And ye shall take you on the first day, the fruit of goodly trees, branches of palm trees, and boughs of thick trees and willows of the brook, and ye shall rejoice before the Lord your God seven days." Each day of the feast a circuit (*haqqafah*) is made during the service with the Lulab in the right hand and Ethrog in the left, while reciting the prayers; beginning and closing with the invocation "Hosanna." On the seventh day seven such processions take place and willow branches are beaten on the benches, and this day is therefore called *Hosannah Rabbah*, the day of the great *Hosanna*.

Manuscript copy of the Book of Esther, written on parchment, with hand-painted views illustrating the events narrated in the book.—The Book of Esther is usually called Megilla (roll), or more fully *Megillath Esther* (roll of Esther). It is read in the Synagogue on the feast of *Purim*, on the 15th of *Adar* (March-April), established to commemorate the deliverance of the Jews from the machinations of Haman related in this book. It is one of the "five rolls" (*hamesh megilloth*) which are read on various occasions in the Synagogue, the others being the Songs of Solomon or Canticles, Ruth, Ecclesiastes, and Lamentations.

Lamp used at the Feast of Dedication (*Hanukkah*). (See plate 17, fig. 2.) The Feast of Dedication is celebrated in commemoration of the purging of the temple and restoration of the altar after Judas Maccabæus had driven out the Syrians in 164 B. C. Its institution is

[1] Leviticus xxiii, 14.

[2] Leviticus xxiii, 15; Deuteronomy xvi, 9.

[3] Exodus xxiii, 16.

[4] Numbers xxviii, 26; compare Exodus xxxiv, 22.

[5] Leviticus xxiii, 17. Since the dispersion Pentecost has been connected by tradition with the day on which the Law was given on Mount Sinai and the festival is called *hag mattan torah*, the feast of the giving of the law.

EXPLANATION OF PLATE 18.

Figs. 1–3. KNIFE AND CUP OF CIRCUMCISION.
(Cat. No. 154437, U. S. N. M. Philadelphia, Pennsylvania. Collected by Mayer Sulzberger).

Fig. 4. SPICE BOX.
(Cat. No. 130297, U. S. N. M. Germany.)

IMPLEMENTS OF CIRCUMCISION, AND SPICE BOX.

PASSOVER PLATE.
Constantinople.
Cat. No. 130291, U.S.N.M.

OMER TABLET.

Cat. No. 154404, U.S N.M. Deposited by David Sulzberger.

recorded in I Maccabees iv, 47–59. According to Josephus,[1] it was called "lights" (*φῶτα, phota*). In the New Testiment[2] it is mentioned under the name of *ἐγκαινία* (*enkainia*). In the Talmud we have the legend that when the Jews entered the temple after driving out the Syrians, they found only one bottle of oil which had not been polluted, and that this was miraculously increased so as to feed the lamps of the sanctuary for eight days. The festival is held eight days, beginning with the 25th of Kislev (December–January). The principal feature of its celebration is the lighting of lights, beginning with one light on the first night and increasing the number by one light on each of the succeeding nights. The specimen is probably of Dutch make and exhibits an interesting survival of the ancient Roman lamps.

KNIFE AND CUP USED AT CIRCUMCISION. (See plate 18, fig. 1.) The rite of circumcision (*milah*) is practiced in pursuance of Genesis xvii, 10–12: "This is My covenant, which ye shall keep, between Me and you and thy seed after thee; every male among you shall be circumcised. And ye shall be circumcised in the flesh of your foreskin; and it shall be a token of a covenant betwixt me and you. And he that is eight days old shall be circumcised among you, every male throughout your generations." In early times circumcision was performed with stone knives.[3] The later Jews used iron or steel knives. With the performance of the rite of circumcision was combined the naming of the child.[4] Circumcision was common in Egypt as early as the fourth dynasty.[5] At the present day it prevails among the Kaffirs and some negro tribes of Africa, in parts of Australia, in many of the South Sea Islands, and it is said to be practiced by the Abyssinian Christians as a national custom. Early Spanish travelers found it to be prevalent in the West Indies, Mexico, and among tribes in South America. It is a common rite among Mohammedans everywhere.

GARMENT OF FRINGES (*Arbaʿ Kanfoth*).—This garment is worn by men in pursuance of the command[6] "Thou shalt make thee fringes upon the four borders of thy vesture, wherewith thou coverest thyself." It is usually made of wool, with fringes attached to the four corners, and is worn over the shoulders, underneath the ordinary outer garment.

PHYLACTERIES (*tefillin*). (See plate 21.)—Used by Jewish males after they attain the age of 13 years and a day, at morning prayers, except on Saturday and other feast days. These objects are employed in the Jewish ritual in pursuance of the command that the words of God should be "a sign upon your hand, and for frontlets between your eyes."[7] They consist of parchment cases containing the passages

[1] Antiquities xii, 7, 7.
[2] John x, 22.
[3] Compare Exodus iv, 246 ("flint"); Joshua v, 2 ("knives of flint").
[4] Luke i, 59; ii, 21.
[5] Compare Herodotus ii, 36, 37, 104; Wilkinson, Ancient Egypt, ch. xv.
[6] Numbers xv, 37–41, and Deuteronomy xxii, 12.
[7] Exodus xiii, 9–10, and Deuteronomy xi, 18.

Deuteronomy vi, 4–9, and xi, 13–21, written on slips of parchment, attached to leather straps for binding on the forehead and left arm. In the case for the head the passages are written on four separate strips, and in the case for the hand on one piece of parchment, and put into a square case. They are called *tefillin* in the Talmud, a word derived from *tefillah* (prayer). The New Testament refers to their ostentatious use.[1]

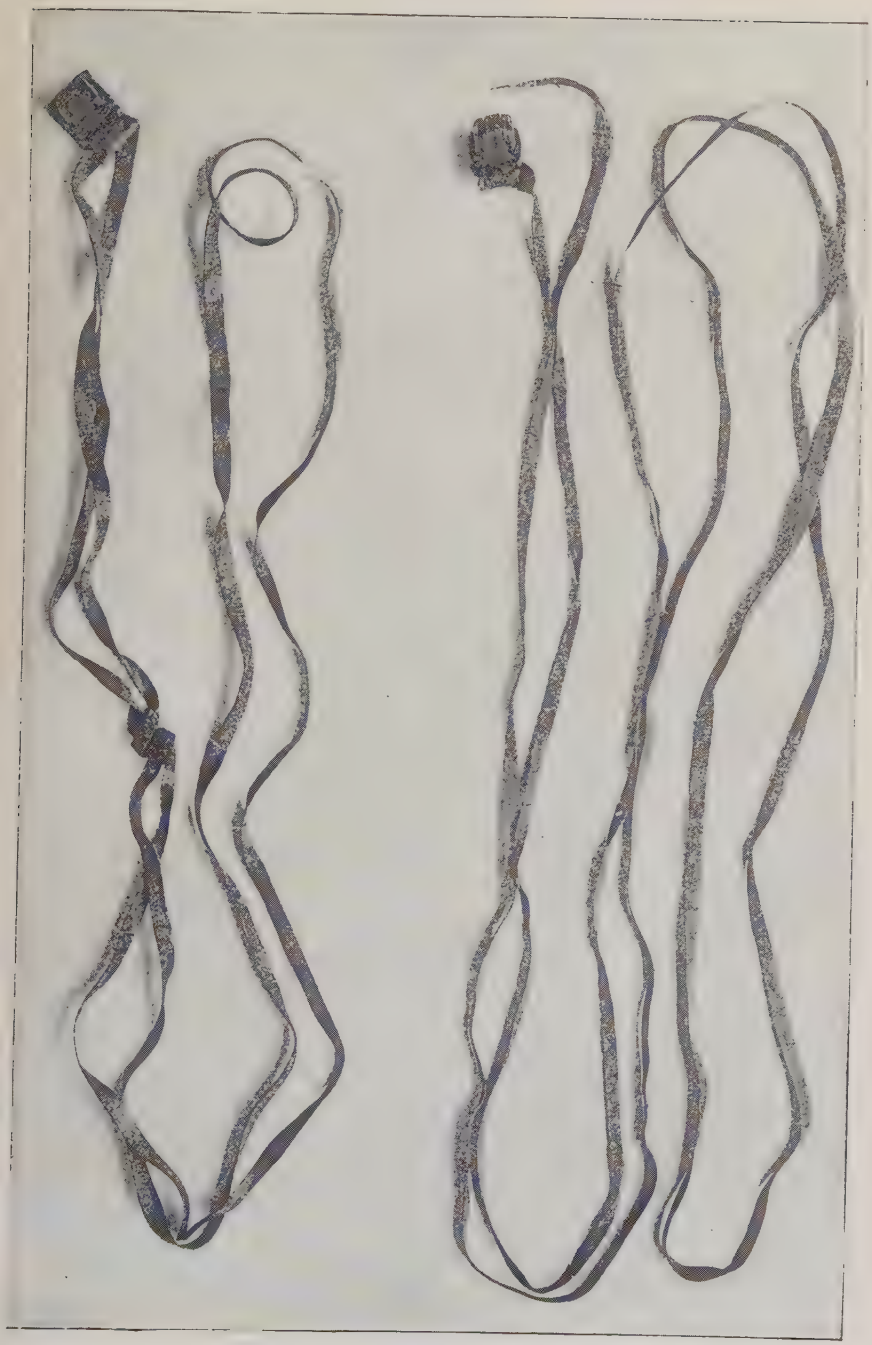
Silk prayer shawl (*Tallith*).—The *tallith* is a kind of prayer shawl made of silk, wool, or linen, with *çiçith* or fringes fastened to the four corners, worn by men at the morning services. It is usually adorned with horizontal stripes of blue or purple; the Jews in the Orient substitute for these stripes a blue ribband worked in the corners. The wearing of a garment with fringes is commanded.[2] In ancient times this garment, it seems, was worn as an outer robe.[3] At present the Jews wear, besides the tallith, a kind of vest with fringes under the upper garments, which is called the "small tallith" (*tallith katon*), or the "four corners" (*arba' kanfoth*).

Gold wedding ring. (See plate 11, fig. 2.) The Jewish marriage is made valid by the *Kiddushin*, i. e., by the bridegroom putting a ring on the hand of the bride while saying the words: "Behold, thou art wedded to me by this ring according to the law of Moses and Israel."

Marriage contract (*kethubah*), written on parchment and illuminated. (See plate 22.) In the *kethubah*, or marriage contract, are recorded the obligations of the husband and the amount of the dowry allowed the bride. There is an established form of the *kethubah* usually beginning with the words: "Under good auspices, and with good luck to bridegroom and bride, 'Whoso findeth a wife findeth a good thing, and obtaineth favor of the Lord.'"[4] The husband pledges himself to love and honor his wife and to provide for her becomingly. The minimum of the dowry is fixed by the law to be 200 shekles (about $50) for a virgin and 100 (about $25) for a widow or divorced woman. To this is usually added what the bride has received from her parents and what the husband settles on her voluntarily, all of which she gets in case of the death of the husband, or of divorce. The contract is dated Rome, in the year of creation 5576 (1816). The contracting parties are Elijah Saki and Masal-Tob (Fortune), of Castlenuovo. The witnesses to the contract are Josua Gerson Ashkenazi and Michael Chayim Megula.

The margin is decorated with various symbolical figures, and contains the liturgy of the wedding ceremony and passages from the Bible and the Talmud referring to marriage and married life, artistically intertwined in garlands. Above, in the center, are probably the arms of the bridegroom; to the right a boy standing on a wheel pouring out the horn of plenty, with the motto, "All depends on merit and good luck;" to the left a female figure with tambourines, and the words, "Peace

[1] Matthew xxiii, 5.
[2] Numbers xv, 37–41; Deuteronomy xxii, 12.
[3] Matthew xxiii, 5.
[4] Proverbs xviii, 22.



PHYLACTERIES (*Tefillin*).

Cat. No. 130276, U.S.N.M. Deposited by David Sulzberger.

MARRIAGE CONTRACT (*Kethubah*).
Rome, Italy.
Cat. No. 154633, U.S.N.M. Collected by Dr. G. Brown Goode.

and welcome to those nigh and far." Below, to the right, is a female figure holding two burning hearts linked together by a chain, with the adage, "A well-mated couple is chosen by God" (marriages are made in heaven); to the left another female figure holding a tambourine and a flower, with a quotation from Isaiah xxxii, 8. The representation at the bottom, of Elijah ascending to heaven in a fiery chariot, his mantle falling on his disciple and successor Elisha,[1] was probably suggested by the name of the bridegroom.

MIZRACH (*the east*).—Mizrach means east, literally the place of the rising sun. There is hung in Jewish houses a tablet on the eastern wall to indicate the direction of the face when at prayer. It contains the Ten Commandments and various quotations from Scripture in Hebrew. The idea which dictates this direction is that the face shall be turned toward Jerusalem. West of Jerusalem the opposite direction would be chosen. In the temple itself the direction of prayer was toward the west, the entrance being from the east. Ancient nations that worshiped the sun turned when in prayer toward the east, the place of the rising sun. This fact is alluded to in Ezekiel viii, 16: "At the door of the temple of the Lord, between the porch and the altar, were about five and twenty men with their backs toward the temple of the Lord and their faces toward the east; and they worshiped the sun toward the east."

KNIFE WITH ITS SHEATH, used for the slaughtering of animals. (See plate 17, fig. 3.) The killing of animals for food is performed by a person especially trained and authorized, called *shochet*. The throat is cut with a long knife (*halaf*) and the internal organs are examined for traces of disease. The act of killing is called *shechita;* that of searching, *bedika*. During both acts short prayers are recited. If there be a notch (*pegima*) in the knife, or if any trace of disease be found, the animal is unfit (*terefa*) to be eaten.

ANTIQUITIES.

Next to the Israelites, with whom the Scriptures originated, the antiquities of those nations with whom Israel came in close contact, and who to a great extent influenced the course and development of the history narrated in the Bible, claim the interest of the Bible student. The exhibits in this department consisted of objects representing Egypt, Assyria, Babylonia, and the Hittites.

EGYPT.

CAST OF A BUST OF RAMSES II.—Ramses II[2] was the third king of the nineteenth dynasty and the most brilliant monarch of Egypt. He was formerly identified as the Pharaoh of the Exodus; later authorities hold that that event took place five years after his death. He was, however, in all probability, the Pharaoh of the oppression. The

[1] II Kings ii, 11–13.

[2] The Sesostris of the Greeks.

reasons for this supposition are that the land of Goshen in which the Israelites settled when they migrated to Egypt[1] is also called the land of Ramses, and that one of the cities which the Israelites built while in bondage was named Ramses.[2] As Ramses I reigned only for a short time, it is assumed that these names are connected with Ramses II, whose reign extended over sixty-six years in the thirteenth century B. C. (1348–1281 B. C.); and who was not only the most warlike but also the greatest builder among the Egyptian kings. The cities Pithom and Ramses which the Hebrews built for Pharaoh are thought to have been situated in the modern Wadi Tumilat. Pithom was identified in 1883 with Tell el-Maskutah in the east of this Wadi at the railroad station Ramses. Besides the building of these two cities and numerous temples, Ramses II seems also to have undertaken the continuation of the canal of the Wadi Tumilat to the Bitter Lakes, and the cutting through of the rising ground between them and the Red Sea, which connection between the Nile and the Red Sea was the true precursor of the Suez Canal.[3] The bust, which is taken from a sitting statue, represents him beardless with a helmet on his head. The original, of black granite, is in the Museum of Egyptian Antiquities in Turin, Italy.

CAST OF A RELIEF OF RAMSES II.—Photographs of the mummy of Ramses II. The mummy was discovered in July, 1881. The photographs were taken immediately after the unwinding of the mummy in June, 1886.[4]

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[1] Genesis xlvii, 6.

[2] Exodus i, 11.

[3] Compare Adolf Erman, Life in Ancient Egypt, p. 27.

[4] Century Magazine, May, 1887. This mummy is in many ways the finest ever discovered and is of surpassing interest. Professor Maspero describes it as follows: "The head is long, and small in proportion to the body. The top of the skull is quite bare. On the temples there are a few sparse hairs, but at the poll the hair is quite thick, forming smooth straight locks about 5 centimeters in length. White at the time of death, they have been dyed a light yellow by the spices used in embalmment. The forehead is low and narrow; the brow ridge prominent; the eyebrows are thick and white; the eyes are small and close together; the nose is long, thin, arched like the noses of the Bourbons, and slightly crushed at the tip by the pressure of bandages. The temples are sunken; the cheek bones very prominent; the ears round, standing far out from the head, and pierced like those of a woman for the wearing of earrings. The jawbone is massive and strong; the chin very prominent; the mouth small, but thick-lipped and full of some kind of black paste. This paste being partly cut away with the scissors disclosed some much worn and brittle teeth, which, moreover, are white and well preserved. The mustache and beard are thin. They seemed to have been kept shaven during life, but were probably allowed to grow during the king's illness, or they may have grown after death. The hairs are white like those of the head and eyebrows, but are harsh and bristly and from 2 to 3 millimeters in length. The skin is of earthy brown, spotted with black. Finally, it may be said the face of the mummy gives a fair idea of the face of the living king. The expression is intellectual, perhaps slightly animal, but even under the somewhat grotesque disguise of mummification, there is plainly to be seen an air of sovereign majesty, of resolve and of pride."

The typical physiognomy of the native Egyptian, as exhibited on the numerous monuments, shows a head often too large in proportion to the body, a square and somewhat low forehead, a short and round nose, eyes large and wide open, the cheeks filled out, the lips thick, but not reversed, and the mouth somewhat wide. Contrasting the features of Ramses II with these, some scholars have assumed that he was of Semitic descent or at least had Semitic blood in his veins.

CAST OF THE HEAD OF SETI I.—The original is at the Museum of Egyptian Antiquities at Cairo, Egypt. Seti I was the second king of the nineteenth dynasty and father of Ramses II, the Pharaoh of the oppression. He reigned for about twenty-seven years in the thirteenth century B. C.

CAST OF A RELIEF OF SETI I.—Photograph of the mummy of Seti I. Taken under the direction of Prof. G. Maspero at the Museum of Egyptian Antiquities, Cairo, Egypt.

CAST OF THE HEAD OF TIRHAKAH.—Original of granite in the Museum of Antiquities at Cairo. King of Egypt and Ethiopia, 698–672 B. C. According to the Biblical account,[1] Tirhakah, "King of Ethiopia" (in Egyptian Taharqa), encountered Senacherib, King of Assyria, while the latter was on his expedition against Judah. From the Cuneiform inscriptions we learn that Tirhakah entered into an alliance with Baal, King of Tyre, against Assyria. Hezekiah, King of Judah, also joined the league. Esarhaddon marched into Egypt, and putting Tirhakah to flight he placed the rule of the whole country under twenty vassals loyal to Assyria. On the death of Esarhaddon, Tirhakah returned to Egypt, drove out the Assyrians that were there, and took possession of Memphis. Assurbanipal, the son and successor of Esarhaddon (668–626 B. C.), at once went to Egypt and defeated him at Karbanit. Tirhakah was again obliged to flee to Thebes and thence to Nubia. The twenty vassal kings were restored and Necho (*Niku*), "King of Sais and Memphis" put at their head. Soon after this Necho headed a rebellion against the Assyrian rule, but the plot was suppressed by the Assyrian garrison of Egypt and Necho sent in chains to Nineveh. But when Assurbanipal heard of the new successes of Tirhakah in Egypt, he sent Necho back to rule over all Egypt under the direction of Assyria. Tirhakah soon afterwards died. Manetho, who calls him *Tarkos* (*Tarakos*), says he was the last king of the twenty-fifth dynasty. Strabo (xvi, I, 6) calls him *Tearkon*, and describes him as one of the greatest conquerors of the ancient world.

MUMMY.—Length, 5 feet 6 inches. Found at Luxor, Egypt, in 1886. (See plates 23 and 24.) No hieroglyphics or inscriptions exist either on the mummy or outer case. The face and head are covered with a mask of green cement, the body delicately proportioned. On the chest lie four small tablets about the size of playing cards, each one having a mummied figure of Osiris in a standing position. Two shield-shaped

[1] II Kings xix, 9, and Isaiah xxxvii, 9.

ornaments lie across the breast and stomach, respectively. The upper one bears the sacred beetle with spread wings, beneath which is a nilometer standing between two figures, which support each a globe upon the head. The faces of these figures are covered with square pieces of gold leaf. At the end of the wings is represented the hawk-head of Ra, also supporting a globe. Over the surface of the shield are painted representations of jewelry. On the lower shield appears a kneeling figure of Nephthys, with extended arms and wings. Upon her head she wears a headband supporting a globe. On either side of the head are two groups, each containing three small figures. Ostrich plumes appear in the corner of the shield. Along the legs is a sheet of cemented linen, on the top of which is a mummy on a dog-shaped bier; at the head of the bier is a figure kneeling, holding an ostrich plume; below this is a group of seven kneeling figures holding plumes. Further down is a second nilometer, on either side of which a figure with an implement in each hand faces two mummied figures, both of which have the faces concealed with a square patch of gold leaf. The feet are incased in a covering of cemented linen.

The Egyptians conceived man as consisting of at least three parts—the body, the soul, and the *Ka*, i. e., the double or genius. The *Ka* was supposed to remain in existence after death, and to be the representative of the human personality. In order that the *Ka* might take possession of the body when it pleased, the body had to be preserved from decay. The preservation of the body was accordingly the chief end of every Egyptian who wished for everlasting life. To this end the Egyptians mummified their bodies, built indestructible tombs, inscribed the tombs and coffins with magical formulæ to repel the attacks of the demons, and placed statutes, household goods, food, statuettes of servants, etc., that the tomb might resemble as much as possible the old home of the deceased.[1] The process of mummifying the bodies by various methods of embalming was of high antiquity in Egypt, probably going back to the earliest dynasties; the oldest mummy which was found at Saqqarah in 1881, and is now at the museum of Gizeh, dates from 3200 B. C. This practice is said to have continued to 500 A. D. The art reached the highest point at Thebes during the eighteenth and nineteenth dynasties, when spices and aromatic substances were used, and the skin of the bodies so prepared as to retain a slight color and a certain flexibility. What is known of the process is derived chiefly from the Greek writers Herodotus[2] and Diodorus Siculus,[3] and from examinations of the mummies themselves. According to these sources the Egyptians employed three methods of embalming, of more or less elaborateness, according to the wealth and position of the deceased. The most costly mode is estimated by Diodorus at a talent of silver—about $1,250. The embalmers first removed part of the brain through the nostrils by means of an iron hook,

[1] Compare Adolf Erman, Life in Ancient Egypt, p. 306. [2] Book ii 85. [3] Book i 91.

MUMMY AND COVER OF COFFIN

Luxor, Egypt.

Cat. No. 129790, U.S.N.M. Gift of Hon. S. S. Cox, U. S. Minister to Turkey.

MUMMY CASE.

destroying the rest by the infusion of caustic drugs. An incision was then made in the side with a sharp Ethiopian stone and the intestines removed. The abdomen was rinsed with palm wine and sprinkled with powdered perfumes. It was then filled with pure myrrh pounded, cassia, and other aromatics, frankincense excepted, and sewn up again. The body was then steeped in natron (subcarbonate of soda) for seventy days, afterwards washed and swathed in strips of linen and smeared with gum. The second mode of embalming cost about 20 minae—about $300. In this case cedar oil was injected into the abdomen. The oil was prevented from escaping, and the body steeped in natron for the prescribed time. On the last day the cedar oil was let out from the abdomen, carrying with it the intestines in a state of dissolution, while the flesh was consumed by the natron, so that nothing was left but the skin and bones. The third method, which was used for the poorer classes, consisted in rinsing the abdomen with syrmaea, an infusion of senna and cassia, and steeping the body for the usual period in natron. Examinations of Egyptian mummies have proven the accounts of Herodotus and Diodorus to be in the main correct. For mummies, both with and without ventral incisions, are found, and some are preserved by means of balsams and gums, and others by bitumen and natrum, and the hundreds of skulls of mummies which are found at Thebes contain absolutely nothing, while other skulls are found to be filled with bitumen, linen rags, and resin. The term "mummy" is derived from the Arabic *mumiya*, "bitumen" and the Arabic word for mummy is *mumiyya* "bitumenized thing." The native Egyptian word for mummy is *sahu*.[1] In the Bible, instances of embalming are only met with in connection with the Egyptians, the bodies of Jacob and Joseph, who died in Egypt, being thus treated.[2]

Model of a mummy. (See plate 25.) Small wooden figure in mummy case. They perhaps represent the servants who accompanied their master in the realm of the departed in order to wait on him there, and were termed by the Egyptians "answerers" (*ushebte*), i. e., those who would answer for the departed and perform the work for him.[3]

Fragments of mummied dog, cat, crocodile, and other animals. (See plate 25.) The Egyptians believed that their several divinities assumed the forms of various animals; so, for instance, Ptah appears as the Apis-bull, Amon as a ram, Sebek is represented as a crocodile-headed man, Bastis as a cat-headed woman, etc. These animals are therefore venerated as the manifestations or symbols of the respective divinities, and the willful killing of one of them was a capital offense. These sacred animals were embalmed and buried in graves. Thus, at Bubastis, the center of the worship of the goddess Bast, was

[1] E. A. Wallis Budge, The Mummy, 1893, p. 173.

[2] Genesis L, 2–26.

[3] Adolf Erman, Life in Ancient Egypt, p. 317, and E. A. W. Budge, The Mummy, pp. 211–215.

a special cemetery for cats, which was recently identified at the modern Zagazig. Diodorus Siculus says[1] that when a cat died all the inmates of the house shaved their eyebrows as a sign of mourning.[2]

BOOK OF THE DEAD.—A series of original fragments and a facsimile of an Egyptian papyrus at the British Museum in London. The so-called Egyptian "Books of the Dead" are collections of religious texts, hymns, invocations, prayers to the gods, etc., intended for the use and protection of the dead in the world beyond the grave. The original of the one referred to was found in the tomb of Ani, "Royal Scribe" and Scribe of the Sacred Revenue of all the gods of Thebes, "who is accompanied on his way through the divers parts of the realm of the dead by his wife, Tutu. The hieroglyphic text is accompanied by colored vignettes, which depict the various scenes through which the deceased has to pass in the nether world, as his appearance before Osiris, the Supreme Judge of the dead, the weighing of the heart of the departed against the goddess of Truth, etc. The prayers and magical formulæ were written out on a roll of papyrus and bound up inside the bandages of the mummy.

TWO SCARABAEI.—The *Scarabæus Aegyptiorum*, or *Ateuchus Sacer*, that is, the great cockchafer found in tropical countries, was regarded in Egypt as the symbol of the god Kheper, who was termed by the Egyptians "the father of the gods," and who was later identified with the rising sun. As the sun by his daily revolution and reappearance typified the return of the soul to the body, the scarabæus, which is in Egyptian likewise called Kheper, was the emblem of the revivication of the body and the immortality of the soul. Models of Scarabæi, made of various kinds of materials, usually inscribed with names of gods, kings, and other persons, and with magical legends and devices, were buried with the mummies (placed on the heart or the finger of the dead) and were also worn by the living, principally as charms. The insects themselves have also been found in coffins.

EGYPTIAN BRICK.—Sun-baked brick from an early tomb, Thebes, Egypt. The usual dimensions of an Egyptian brick was from 20 or 17 to 14½ inches in length, 8¾ to 6½ inches in width, and 7 to 4½ inches thick. It consists of ordinary soil mixed with chopped straw and sun-baked. This method of making bricks is alluded to in Exodus v, 18, where the oppressed Israelites are told "there shall no straw be given you, yet shall ye deliver the tale of bricks." In the ruins of Pithom, one of the cities in which the Israelites were employed, three kinds of brick were discovered, some with stubble, some with straw, and some without. Among the paintings of Thebes, one on a tomb represents brick-making captives with "taskmasters," who, armed with sticks, are receiving the "tale of bricks" and urging on the work. Judging from the monuments, the process of making sun-dried bricks was much the same as in modern times. The clay or mud was mixed with the neces-

[1] Book i, 83. [2] E. A. W. Budge, The Mummy, pp. 355–358.

MODEL OF A MUMMY AND FRAGMENTS OF MUMMIED ANIMALS

Egypt.

Cat. No. 1565, U.S.N.M. Collected by George R. Gliddon.

sary amount of straw or stubble by treading it down in a shallow pit. The prepared clay was carried in hods upon the shoulders and shaped into bricks of various sizes.[1]

MODERN EGYPTIAN BRICK FROM THEBES.—Of the same general make and character as the ancient specimen.

EGYPTIAN COTTON.—Cotton of a very fine grade is now grown in Egypt. The question as to whether it was known or extensively used in that country, or in other lands bordering on the Mediterranean, is one that has given rise to much discussion. Authorities on the cotton plant have definitely asserted that it was well known in Egypt from early times; thus M. Jardin[2] states that it is certain that the cotton plant existed in Upper Egypt, Nubia, and Abyssinia in the wild state; that it was known to the ancient Egyptians, and that the proof of its existence is the finding of some seeds of *Gossypium Arboreum*, by Rosellini, in the coffin of a mummy. He further holds the opinion that linen and cotton were simultaneously employed in Egypt, but that the former was more costly than the latter and was reserved for purposes relating to the cult. In the valuable work on the Cotton Plant issued by the United States Department of Agriculture,[3] Mr. R. B. Handy, the author of a chapter on the Ancient History of Cotton, holds practically the same view.[4] On the other hand, it has been claimed by some authors that cotton was quite unknown in Egypt, a fact largely based upon the conclusions arrived at by James Thomson in an article on the "Mummy Cloths of Egypt."[5] Mr. Thomson, after twelve years' study of the subject, reached the opinion that the bandages of the mummy were universally made of linen. It would appear that cotton was not well known to the ancient Israelites, for we find it mentioned but once in the Bible, in the Book of Esther,[6] which, of course, has a Persian background and contains a description of a Persian palace. The passage reads: "In the court of the garden of the King's Palace there were hangings of white and violet-colored cotton cloths fastened with cords of fine linen and purple to silver rings and pillars of marble." The Hebrew word translated "cotton" is "karpas," derived from the Sanskrit "karpasa."

Between the extremes of opinion, the truth seems to be that cotton was indigenous in India and that its products made their way gradually, through commerce, to the Mediterranean countries and that the plant itself followed gradually either through commerce or by way of Persia. It is plain that the cotton plant existed in Egypt in the time of Pliny

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[1] Adolf Erman, Life in Ancient Egypt, p. 417.

[2] Le Cotton, pp. 10, 11.

[3] Bulletin 33, Office of Experiment Station.

[4] See also the Descriptive Catalogue of Useful Fiber Plants of the World, by Charles Richards Dodge, issued by the Department of Agriculture, 1897.

[5] London and Edinburg Philosophical Magazine, 3d ser., V, p. 355, cited by Budge in The Mummy, p. 190.

[6] Chapter I, verses 5, 6.

(the first century of the Christian era), and it also seems likely that inasmuch as there is no representation whatsoever on any Egyptian monuments thus far found, or on any monuments found in Western Asia, of a cotton plant, that it was not known in that country in early days. It is difficult to conclude that so striking an object would not have been depicted on the monuments, when the ancient artists found it possible to figure so many of the various plants known to them.

ASSYRIA AND BABYLONIA.

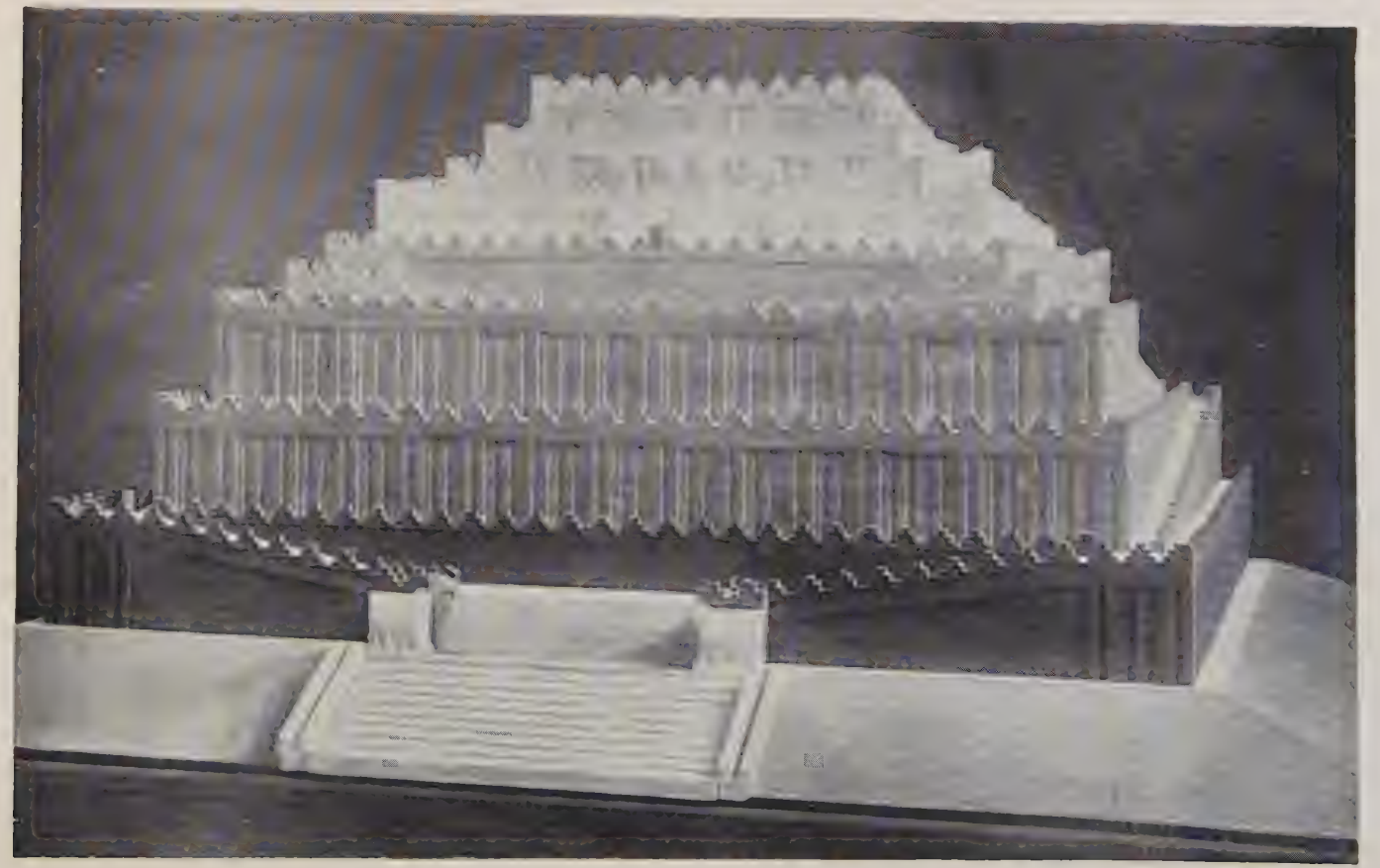
Illustrating these countries the following specimens were shown:

CAST OF THE SO-CALLED OVAL OF SARGON.—The original is a small egg-shaped piece of veined marble, pierced lengthwise. It was discovered by Mr. Hormuzd Rassam at Abu-Habba, Babylonian *Sippar* (in the Bible *Sepharvaim*), a city from which the King of Assyria transported colonists to Samaria. The inscription reads: "I, Sargon, the king of the city, King of Agade, have dedicated this to the Sun-god (Samas) of Sippar." This king is supposed to have reigned about 3,800 B. C., and the object is no doubt a contemporary document. The date is derived from a statement on the cylinder of Nabonidus found at the same place. Nabonidus, the last King of Babylon (555–538 B. C.), the father of Belshazzar, records that when rebuilding the Temple of the Sun-god he found the original foundation stone of Naram-Sin, Sargon's son, which none of his predecessors had seen for 3200 years. Agade, mentioned on the Oval of Sargon, is Akkad, enumerated in the genealogical tablet[1] as one of the four cities of Nimrod's empire. Akkad was also the name of the entire district of North Babylonia.[2]

MODEL OF A TEMPLE TOWER OF BABYLON.—The model is plaster, painted, and was made after the descriptions of the Temple Tower of Borsippa, on the scale of one-fourth inch to the foot. (See plate 26.) From the most ancient times the principal cities of Mesopotamia had towers. These were used as observatories, also for the performance of religious ceremonies, and perhaps in early times for military defense. In Genesis xi, 1–9, it is related that certain immigrants began to build in the plain of Shinear a city and a tower, which was left incomplete in consequence of the confusion of tongues, and the city was thence called Babel (confusion). This "Tower of Babel" has been connected both by Arab tradition and on the authority of archaeologists with the imposing ruins of Birs-Nimrud ("Nimrod's Tower") on the site of the Temple Tower of Nebo, at Borsippa, which was a surburb of the city of Babylon, and which in the cuneiform inscriptions is called "Babylon the Second." This Temple Tower of Borsippa, termed in the inscriptions *E-zida* ("the eternal house"), was a perfect type of these edifices, and it has been suggested as probable that the Tower of Babel men-

[1] Genesis x, 10.

[2] Proc. Society of Biblical Archaeology, VI, p. 68; VII, p. 66; VIII, p. 243.



MODEL OF A BABYLONIAN TEMPLE TOWER,

Made in the U. S. National Museum.

tioned in Genesis was conceived on the same plan. The Temple of Borsippa was reconstructed with great splendor by Nebuchadnezzar (604–561 B. C.), but he made no changes in the general character and plan. According to the description of Herodotus,[1] who mistakes it for the Temple of Bel, and the report of Sir Henry Rawlinson, who carefully examined the mound of Birs-Nimrud, the Tower of Borsippa appears to have been constructed on the plan of a step-shaped or terraced pyramid. Such stepped pyramids have not only survived in Egypt, in the Great Pyramid of Sakkarah, but are also found in Mexico (at Cholula, City of Mexico, etc.), where they are called *Teocallis*—i. e., "houses of god"—consisting of terraced structures, five to seven stories high, and surmounted by a chamber or cell, which is the temple itself. It is assumed that these temple towers were the prototype of the later Egyptian pyramids, the stories disappearing in the latter by filling up the platforms of the different stages, which produced an uninterrupted slope on all sides. The Temple Tower of Nebo, at Borsippa, was built in seven stages, whence it is sometimes called in the inscriptions "Temple of the seven spheres of heaven and earth." Upon an artificial terrace of burnt bricks rose the first stage, 272 feet square; on this the second, 230 feet square; then the third, 188 feet square, each of these three lower stages being 26 feet high. The height of each of the four upper stories was 15 feet, while their width was 146, 104, 62, and 20 feet, respectively, so that the whole edifice, not including the artificial terrace, had a height of about 140 feet. The several stages were faced with enameled bricks in the colors attributed to the different planets, the first story, representing Saturn, in black; then, in order, Jupiter, orange; Mars, red; the Sun, thought to have been originally plated with gold; Venus, white; Mercury, blue, and the seventh, dedicated to the Moon, the head of the Babylonian pantheon, was plated with silver. The floors of the platforms were probably inlaid with mosaics. The whole structure terminated in a chapel placed on the central axis of the tower and surmounted by a cupola. According to Herodotus there stood in the spacious sanctuary on the top of the tower a couch of unusual size, richly adorned, with a golden table by its side. But no statue of any kind was set up in the chamber, nor was it occupied at night by anyone but a native woman. The top stage was also used as an observatory. Double converging stairs or gently ascending ramps led up to the several platforms.

The Chaldean Deluge Tablet.—Containing the cuneiform text of the Babylonian account of the Deluge as restored by Prof. Paul Haupt. Engraved in clay under the direction of Professor Haupt, by Dr. R. Zehnpfund, of Rosslau, Germany. Measurement, $8\frac{3}{8}$ by $6\frac{3}{8}$ inches. The Babylonian story of the Deluge is contained in the eleventh tablet of the so-called Izdubar or Gilgamesh[2] legends, commonly known under the name of the Babylonian Nimrod Epic. The Babylonian

[1] Book i, 181–183. [2] This name is also read by some Gizdubar and Gibel-gamesh.

narrative of the Deluge closely accords both in matter and language with the biblical account as contained in Genesis vi–viii. Xisuthrus or Hasisadra, the hero of the Babylonian account, corresponding to the Biblical Noah, is informed by a god of the coming flood and ordered to build a ship to preserve himself, his family, and friends, and various animals. After he had sent out divers birds (a dove, swallow, and raven) he landed on the mountain Nizir, in Armenia, and offers a sacrifice to the gods, after which he is transferred to live with the gods. The originals were found during the British excavations in the Valley of the Euphrates and Tigris, and are now preserved in the British Museum, in London. There was also exhibited a cast of some of the original fragments now preserved in the British Museum.

CAST OF A COLOSSAL HUMAN-HEADED WINGED LION, 11 by 9 feet; original of yellow limestone in the British Museum. It was found by Sir Austen H. Layard in 1846 at Kuyunjik on the site of ancient Nineveh, and is supposed to belong to the period of Asurnazirpal, who reigned 884–860 B. C. Figures of composite animals of stone or metal, sometimes of colossal size, were placed by the Assyrians at the entrances to the temples of the gods and the palaces of the kings. They were considered as emblems of divine power, or genii (Assyrian, *shedu*), and believed to "exclude all evil." Lions were also placed "beside the stays" and on either side of the steps of the gilded ivory throne of Solomon.[1] Some Assyriologists connect the Assyrian winged and composite beings with those seen by the prophet Ezekiel in his vision of the "chariot," as described in the first chapter of his prophecies, and the cherubim guarding the entrance to the Garden of Eden[2] and those carved on the Ark of the Covenant.[3] Parallels are also found in the religious figures of other peoples, as the sphinx of the Egyptians and Persians, the chimera of the Greeks, and the griffin of northeastern mythology. It would seem that the composite creature form was intended to symbolize either the attributes of divine essence or the vast powers of nature as transcending that of individual creatures.

The winged lion, called "Nergal," was also sacred to Anatis and to Beltis, the goddess of war.

CAST OF THE BLACK OBELISK OF SHALMANESER II, King of Assyria 860–824 B. C. The original of black basalt, which is now preserved in the British Museum, was accidentally discovered by Sir Austen Henry Layard at Nimrud, on the site of the Biblical Calah,[4] about 19 miles below Nineveh. The obelisk is about 7 feet high. The terraced top and the base are covered with cuneiform script containing a record of Shalmaneser's campaigns nearly to the last year of his long

[1] I Kings x, 19, 20.

[2] Genesis iii, 24.

[3] Exodus xxv, 18, etc. Compare also the "four living creatures" in Revelations v, 14; vi, 1.

[4] Genesis x, 12.

reign. The upper part is occupied by five compartments of bas-reliefs running in horizontal bands around the four sides, and representing processions of tribute bearers from five nations. Narrow bands between the compartments contain short legends descriptive of the scenes represented. The Black Obelisk and the other monuments of Shalmaneser II supplement the Biblical narrative We learn from them that he was the first Assyrian king, so far as is yet known, to come into relations with Israel. Among the tribute bearers represented on the obelisk are Israelites, and in the second row is a legend reading, "Tribute of Ya'ua, son of Humri: silver, gold, vials of gold, cups of gold, pans of gold, vessels of gold, of lead, scepters for the King's hand, axes I received."[1] In the record of the sixth year of his reign (854 B. C.) Shalmaneser relates his victorious campaign against Benhadad, King of Damascus (in the inscription Dadidri), Ishiluna of Hamat, and their confederate kings. From another inscription engraved by Shalmaneser in the rocks of Armenia it is learned that one of the allies of this great coalition led by Benhadad against Assyria was Ahab, King of Israel (in the Assyrian inscription Ahabbu Sirlai), who had furnished 2,000 chariots and 10,000 soldiers. Neither of these facts—the participation of Ahab in the Syrian league and the payment of tribute to Shalmaneser by Jehu—is recorded in the Bible. This King is not to be confounded with Shalmaneser IV (727–722 B. C.), who is mentioned in II Kings xviii, 9, in connection with the conquest of Samaria.[2]

CAST OF A BELL, the original of which is in the Royal Museum of Berlin. The bell is decorated in bas-relief with the figure of Ea, the Assyro-Babylonian divinity of the ocean, also called the "Lord of Profound Wisdom," and hence considered as the god of science and culture. He is represented in human form covered over by a fish. He is probably identical with the Oannes, described by the Chaldean priest Berosus as the founder of civilization. Through a mistaken etymology of Dagon from Hebrew *dag*, fish, the Philistine divinity of that name, mentioned in I Samuel v, was thought to have been a fish god and identified with the water god Ea. Dagon was also a divinity of the Assyro-Babylonians, known by the name of Dagan, but had no connection with the water. He was considered by the Phenicians and, therefore, presumably, by the Philistines also, as the god of agriculture.[3] Besides the representation of Ea, there are also on the bell figures of several demons and a priest.

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[1] II Kings ix and x.

[2] This monument is described by Theo. G. Pinches, British Museum, Guide to the Nimroud Central Saloon, 1886, pp. 26–45; the inscription is translated by Dr. Edward Hincks, Dublin University Magazine, XLII, 1853, pp. 420–426; A. H. Sayce, Records of the Past, V, pp. 27–42.

[3] See A. H. Sayce, Hibbert Lectures on the Religion of the Ancient Babylonians, pp. 188, 189, and in Smith's Dictionary of the Bible under *Dagon*, and The Sunday School Times, May 27, 1893.

THE HITTITES.

The Hittites (Hebrew *Hittim*) are derived in the Bible from Heth, son of Canaan, the son of Ham.[1] They are depicted as an important tribe settled in the region of Hebron on the hill,[2] and are often mentioned as one of the seven principal Canaanitish tribes, and sometimes as comprising the whole Canaanitish population.[3]

From Abraham to Solomon the Hittites came more or less in contact with Israel. Numbers of them remained with the Jews even as late as the time of Ezra and Nehemiah.[4] Hittite kings are mentioned as settled north of Palestine,[5] and some scholars distinguish the latter as Syrian Hittites from the Canaanite tribe. Recently the Hittites have been identified with the *Cheta* of the Egyptian and *Chatti* of the Assyrian monuments.

From the notices on these monuments it is gathered that this people at an early period constituted a mighty power, dominating, for a time, the territory from the Euphrates to the Ægean, and standing forth as rivals of Egypt and Assyria. As early as the seventeenth century B. C., a struggle began for supremacy between Egypt and the Hittites, which lasted for five hundred years, when Ramses II defeated the Hittites at Kadesh, on the Orontes. He did not conquer them, however, but was compelled to make an alliance. From the twelfth to the eighth century B. C., the Hittites were in conflict with Assyria, until the Assyrian King, Sargon, put an end to the Hittite dominion in 717 B. C., when the inhabitants of Carchemish, the Hittite capital in Syria (the modern Jerablus on the Euphrates), were deported to Assyria, and the city was repeopled with Assyrian colonists.

Of late there have been added to the Biblical, Egyptian, and Assyrian sources numerous monuments which were discovered throughout Asia Minor and Northern Syria, and which are by some scholars attributed to the Hittites. The beginning was made by two Americans, Mr. J. Augustus Johnson, of the United States consular service, and Rev. S. Jessup, who in 1870 found Hittite inscriptions at Hama, in Syria. Later discoveries were made, especially by Humann and Puchstein, under the auspices of the German Government (1872), and by Ramsay and Hogarth (1890). The monuments, mostly of black basalt, contain representations in bas-relief of religious objects, winged figures, deities standing on various animals, sphinxes, gryphons, the winged disk, as symbol of the deity, the two headed eagle (which became the standard of the Seljukian Turks, and afterwards of Austria and Russia, etc.), and inscriptions in hieroglyphic characters, written in alternating lines from right to left and left to right (*boustrophedon*). The art exhibited on these monuments is of a primitive, rude character, and recalls the early art of Babylonia, Greece, and Phenicia. The inscrip-

[1] Genesis x, 15.
[2] *Idem.* xxiii, 2.
[3] Joshua, 4, etc.
[4] Ezra ix, 1.
[5] I Kings x, 29; II Kings vii, 6.

tions have not yet been deciphered, and the race affinity of the Hittites and the place of their language among linguistic families are still disputed questions. Thus, J. Halevy[1] considers the originators of these monuments as Semites; P. Jensen[2] would designate them as Aryans (Cilicians), while the Italian, Cesare de Cara[3] identifies them with the Pelasgians, the ancient prehistoric inhabitants of the Grecian countries.

The pictorial representations of the Hittites, on the Egyptian as well as on their own monuments, show that they were a short, stout race, with yellow skin, receding foreheads, oblique eyes, black hair, and chin, as a rule, beardless. They wore conical caps and boots with upturned tips. These characteristics would seem to suggest that they were neither of Semitic nor Aryan origin, but belonged to the Mongolian or Turanian family, and this is as yet the more prevalent opinion.[4] The following casts of Hittite sculptures were shown:

CAST OF A COLOSSAL STATUE OF THE GOD HADAD, inscribed in the old Aramean dialect. (See plate 27.) The original of dolorite, now preserved in the Royal Museum of Berlin, was discovered by von Luschan and Humann at Gertchin, near Senjirli, which is about 70 miles to the northeast of Antioch in northern Syria. The excavations in this region were carried on by these scholars between 1888 and 1891 under the auspices of the German Oriental committee constituted for that purpose. The most important finds made during these excavations, besides the statue of Hadad, were the stele of Esarhaddon, King of Asyria, 681–668 B. C., bearing an inscription in Assyrian cuneiform writing, and a statue erected by Bar-Rekub to the memory of his father Panammu, King of Samaal, the ancient Semitic name of the region of Senjirli, inscribed, like the statue of Hadad, in the old Aramean dialect. Both these Aramean inscriptions are cut in high relief, like the hieroglyphic inscriptions on the Hittite monuments. The character of the writing resembles that of the Moabite stone and the language bears a closer resemblance to Hebrew than the Aramaic of the later period.

The statue of Hadad was erected by Panammu, son of Karul, King of Ja'di, in northern Syria, in the eighth century B. C., to the gods El, Reshef, Rakubel, Shemesh, and above all to Hadad. Hadad was the name of the supreme Syrian deity, the Baal, or Sun god, whose worship extended from Carchemish, the ancient Hittite capital in Syria, to Edom and Palestine.

Many Edomite and Syrian kings bore the name of the deity as a title.[5] In Zachariah xii, 11, there is mentioned a place in the valley of

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[1] Revue Sémitique for 1893 and 1894.

[2] Zeitschrift der Deutschen Morgenländischen Gesellschaft XLVIII, p. 235.

[3] Gli Hethei-Pelasgi.

[4] Compare A. H. Sayce, The Hittites: the story of a forgotten Empire, London, 1888; Campbell, The Hittites, their inscriptions and their history, London, 1891; W. Wright, Empire of the Hittites, 1884.

[5] Compare Genesis xxxvi, 35; II Samuel viii, 3; Hadadezer, etc.

Megiddo named after the two Syrian divinities "Hadad-Rimmon." Coins bear the name of Abd-Hadad, "servant of Hadad," who reigned in the fourth century B. C., at Hieropolis, the later successor of Carchemish, and in the Assyrian inscriptions there occurs the abbreviated form of "Dada, god of Aleppo." Of the four other divinities named, El became the generic term for deity among Hebrews and Assyrians. Shemesh is the Sun god (Assyrian Shamash). Reshef appears to be a Hittite divinity, while Rekubel is met with here for the first time. The inscription contains thirty-four lines. The first part (lines 1 to 15) contains the dedication of Panammu to the gods to whom the monument was erected, who conferred on him the government over Ja'di, and granted the land plenty and abundance. The second part (lines 13 to 24) relates the injunction of Karul to his son Panammu, that he erect a statue to Hadad and honor him with sacrifices. The third part (lines 24 to 34) contains the usual curses against those who should destroy, deface, or carry off the monument.[1]

HITTITE DIVINITY, with trident and hammer. (See plate 28.) Cast from original of dolerite at the Royal Museum, Berlin, Germany. Found at Senjirli, Asia Minor.

HITTITE WINGED DIVINITY, with head of griffon. (See plate 29.) Cast from original of dolerite at the Royal Museum, Berlin, Germany. Found at Senjirli, Asia Minor.

HITTITE GOD OF THE CHASE, holding hares. (See plate 30.) Cast from original of dolerite at the Royal Museum, Berlin, Germany. Found at Senjirli, Asia Minor.

HITTITE FIGURE, surmounted by winged sun disk. Cast from original of calcareous rock at Boghazkeui, Asia Minor. (See plate 31.) The winged solar disk was the emblem of the supreme divinity among the Hittites, Egyptians, and Assyrians.

HITTITE WINGED SPHINX, with human head. (See plate 32.) Cast from original, of dolerite, at the Royal Museum, Berlin, Germany. Found at Senjirli, Asia Minor. It is assumed that the Hittite, not the Egyptian, form of the sphinx was the prototype of the sphinx as represented by the Greeks.

HITTITE WINGED SPHINX, with double head of man and lion. (See plate 33.) Cast from original, of dolerite, at the Royal Museum, Berlin, Germany. Found at Senjirli, Asia Minor.

HITTITE KING, in long robe, with scepter and spear. (See plate 34.) Cast from original, of dolerite, at the Royal Museum, Berlin, Germany. Found at Senjirli, Asia Minor.

THREE HITTITE WARRIORS. (See plate 35.) Cast from original, of calcarous rock, at Boghazkeui, Asia Minor. The high-peaked cap and the pointed boots seen on the figures are still in use among the peasantry in Asia Minor.

[1] Compare Ausgrabungen in Sendschirli I, 1893 (published by the Berlin Museum), Prof. D. H. Mueller in Zeitschrift fuer die Kunde des Morgenlandes VII, Nos. 2 and 3, and in Contemporary Review of April, 1894.

HADAD.
Gertchin, Northern Syria.
Original in Royal Museum, Berlin.
Cat. No. 155007, U.S.N.M.

HITTITE DIVINITY WITH TRIDENT AND HAMMER.
Original in Royal Museum, Berlin.
Cat. No. 155032, U.S.N.M.

HITTITE WINGED DIVINITY WITH HEAD OF GRIFFON.

Senjirli, Asia Minor.

Original in Royal Museum, Berlin.

Cat. No. 155033, U.S.N.M.

HITTITE GOD OF THE CHASE HOLDING HARES.

Senjirli, Asia Minor.

Original in Royal Museum, Berlin.

Cat. No. 155030, U.S.N.M.

HITTITE FIGURE SURMOUNTED BY WINGED SUN DISK.
Boghazkeui, Asia Minor.
Original in Royal Museum, Berlin.
Cat. No. 155015, U.S.N.M.

HITTITE WINGED SPHINX WITH HUMAN HEAD

Senjirli, Asia Minor.

Original in Royal Museum, Berlin.

HITTITE WINGED SPHINX WITH DOUBLE HEAD OF MAN AND LION.
Senjirli, Asia Minor.
Original in Royal Museum, Berlin.
Cat. No. 155039, U.S.N.M.

HITTITE KING WITH SCEPTER AND SPEAR.
Senjirli, Asia Minor.
Original in Royal Museum, Berlin.
Cat. No. 155040, U.S.N.M.

HITTITE WARRIORS.
Boghazkeui, Asia Minor.
Original in Royal Museum, Berlin.
Cat. No. 155013, U.S.N M.

HITTITE LION CHASE.

Sculptured
Ornamental in Royal Museum, Berlin.

HITTITE WARRIOR WITH AX AND SWORD.
Senjirli, Asia Minor
Original in Royal Museum, Berlin
Cat. No. 155041, U.S.N.M.

HITTITE LUTE PLAYER.—Cast from original, of dolerite, at the Royal Museum, Berlin, Germany. Found at Senjirli, Asia Minor. (See plate 8.)

HITTITE LION CHASE. (See plate 36.) This relief, which probably served to decorate the gate of a temple or palace, plainly exhibits Assyrian influence. As on Assyrian hunting scenes, the lion is chased from a chariot occupied by the charioteer and the archer. In front of the chariot and its spirited horse the lion is attacked by two men, who drive spears in the fore and hind parts of its body. The whole scene combines archaism with vivid and powerful naturalism. The original, of granite, was found at Saktschegözu and is now in the Royal Museum of Berlin, Germany.

HITTITE WARRIOR, with ax and sword. (See plate 37.) Cast from original, of dolerite, at the Royal Museum, Berlin, Germany. Found at Senjirli, Asia Minor. The relief probably served to decorate the gate of a temple or palace.

COLLECTION OF BIBLES.

The last section of the exhibit consisted of a small collection of bibles, arranged so as to show the originals and the versions. It included manuscripts and old and rare editions of the original texts, as well as copies of the most important ancient and modern translations of the scriptures. This part of the exhibit was not only of interest to biblical students, but also served to illustrate the study of palæography.

THE OLD TESTAMENT.—The Old Testament is mainly written in the Hebrew language, which was the Semitic dialect spoken in Canaan. 't is cognate to Assyrian, Arabic, Ethiopic, and Aramean, and most losely allied to Phenician and Moabite. Daniel ii, 4, to vii, 28, and Ezra iv, 8, to vi, 18, and vii, 12–26, are written in Aramean; also a few vords in Genesis and Jeremiah.

The canon of the Old Testament is divided by the Jews into three portions—the law, the prophets, and the writings—and subdivided into twenty-four books. Josephus counts twenty-two books, which was followed by Origen. The fixing of the canon goes back by tradition to Ezra and the men of the great synagogue; some, however, are of the opinion that the canonicity of the prophets and writings (Greek hagiographa, or sacred writings) was settled much later. According to the present actual count the Old Testament contains thirty-nine books. This, however, does not argue a different content from ancient times—simply a further subdivision of books.

Before the Exile the books were written in the ancient Phenician characters which appear in some ancient Phenician inscriptions, on the Moabite stone, on some coins of the Maccabees, and in the Samaritan Pentateuch. In the period following the Exile and the restoration of Ezra the square letters, also called "Assyrian script," which are repre-

sented in the printed editions of the Old Testament, had gradually been introduced.

Originally the Hebrew text was written without divisions into chapters and verses, and earlier still, no doubt, without divisions into words. Great care, however, was observed to transmit the text correctly. Josephus asserts that "no one has been so bold as either to add anything to them, take anything from them, or to make any change in them" (the books of the Bible). Philo Judæus asserts that "the Jews have never altered one word of what was written by Moses," and in the Talmud a scribe is exhorted as follows: "My son, take care how thou doest thy work (for thy work is a divine one), lest thou drop or add a letter."

Nevertheless, it seems likely that errors crept into the text. Accordingly, a body of Jewish scholars known as the Massorites labored for eight centuries (the second to the tenth of the Christian era) to fix the text. They added a number of marginal readings where the text was obscure or faulty, introduced a system of punctuation and accents, and made divisions into chapters, paragraphs, and verses. They counted and recorded the number of sections, verses, words, and even letters contained in the different books. The work of the Massorites on the original text of the Old Testament closes with the schools of Aaron ben Asher in Palestine and Moses ben Napthali in Babylonia, and it is generally admitted that the text has been handed down to us in a comparatively pure and trustworthy form. The oldest complete manuscript of the Old Testament which is known dates from the year 1009 A. D.

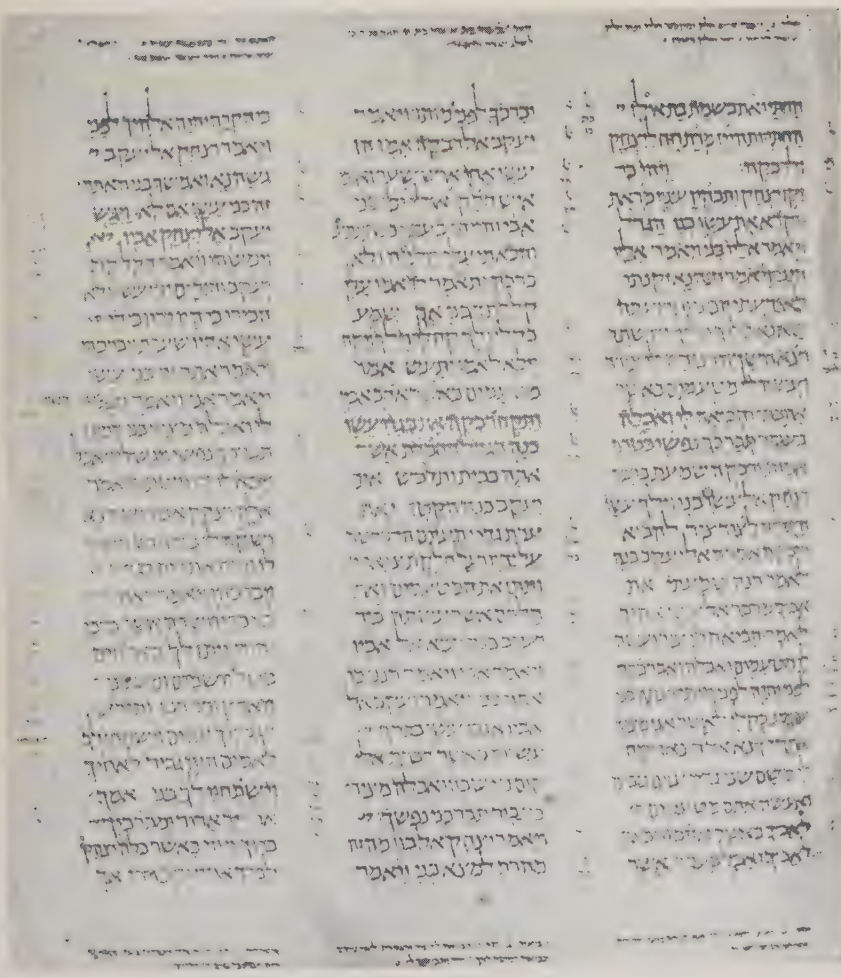
The New Testament.—The New Testament was written in Greek in its Hellenistic idiom. The original handwork of the authors perished early. The oldest manuscripts known date from the fourth century. The canon of the New Testament as it now stands and is accepted by all the churches was fixed by the councils of Hippo (393) and Carthage (397) under the influence of St. Augustine. The present division of chapters in the New Testament was originated by Cardinal Hugo of St. Caro in the thirteenth century; that of the verses was made in imitation of the Old Testament, and is first found in the Latin translation of the Vulgate, and only as late as 1551 was it placed by Robert Stephanus on the margin of the Greek text.

The following specimens were shown:

Hebrew Bible. Facsimile of Aleppo Codex. (See plate 38.) The original manuscript is preserved in the synagogue at Aleppo, Syria. It is assigned to Aaron ben Asher (beginning of the tenth century), and considered as one of the best authorities for the text of the Old Testament, but is probably of somewhat later origin.[1]

Fragments of manuscript of the Hebrew Bible. (See plates 39 and 40.) Thirteenth century. Containing a portion of the Psalms

[1] Wicke's Treatise on the Accentuation of the Prose Books of the Old Testament.



FACSIMILE OF ALEPPO CODEX (Genesis xxvi, 34; xxvii, 30).
Aleppo, Syria.
Cat. No. 155083, U.S.N.M.

HEBREW MANUSCRIPT OF THE THIRTEENTH CENTURY (Psalms cxxix-cxxxii).
Cairo, Egypt.
Cat. No. 155081, U.S.N.M. Deposited by Dr. Cyrus Adler.

HEBREW MANUSCRIPT OF THE THIRTEENTH CENTURY (Deuteronomy v, 1-6).
Cairo, Egypt.
Cat. No. 155081, U.S.N.M. Deposited by Dr. Cyrus Adler.

(cxxix to cxxxii, 14) and Deuteronomy v, 1–6. These were no doubt from the Genizah, since made famous by the great manuscript finds of Dr. S. Schechter, of Cambridge, England.

PRINTED EDITIONS OF THE HEBREW BIBLE.—Soon after the invention of the art of printing parts of the Old Testament were published. Thus the Psalter with Kamchis Commentary appeared in 1477 (place unknown); the Pentateuch with the Targum and the Commentary of Rashi in 1482 at Bologna, Italy. The first complete Hebrew Bible was printed at Soncino, Italy, in 1488. The second edition has neither date nor place. The third was published at Brescia, Italy, in 1494. It was the one used by Luther for his German translation. The present copy shown was a reprint, with slight alterations, of the Bible printed by Daniel Bomberg at Venice in 1517. In this edition the first effort was made to give some of the Massoretic apparatus. It contains, besides the Hebrew original, several of the Chaldean Targums and commentaries. The editor was Felix Pratensis.

HEBREW BIBLE, without vowel points, Antwerp, 1573–74.—This Bible was printed by the famous printer, Christopher Plantin (born 1514, died 1589).

HEBREW BIBLE, edited by Elias Hutter (three volumes), Hamburg, 1587.—Hutter was professor of Hebrew at Leipsic. The peculiarity of this Bible consists in the fact that the roots are printed in solid black letters, whereas the prefixes, suffixes, and formative letters (called servile letters in Hebrew grammar) are shaded.

THE HEBREW BIBLE, first American edition (see plate 41), published by Thomas Dobson, Philadelphia, 1814 (two volumes), printed by William Fry.—In 1812 Mr. Horwitz had proposed the publication of this edition of the Hebrew Bible, the first proposal of this kind in the United States. Early in 1813 he transferred his right and list of subscribers to Mr. Thomas Dobson. The work was advertised as follows in "Poulson's American Daily Advertiser," Monday, May 30, 1814:

Hebrew Bible
This day is published,
By Thomas Dobson,
No. 41, South Second Street
The First American Edition of
The Hebrew Bible,
Without the Points.

Elegantly printed by William Fry, with a new fount of Hebrew Types, cast on purpose for the work by Binney & Ronaldson, on the best superfine wove paper, two large volumes octavo.

Price in boards, Fifteen Dollars.

Subscribers will receive their copies at *Subscription Price* by applying to Thomas Dobson as above. This arduous undertaking the first of the kind attempted in the United States is now happily accomplished. The work is considered as one of the finest specimens of *Hebrew Printing* ever executed: and it is hoped will be generally

encouraged by the Reverend Clergy of different denominations, and by other lovers of the Sacred Scriptures in the Hebrew Language.

POLYCHROME EDITION OF THE OLD TESTAMENT, edited by Prof. Paul Haupt, since 1892.—Some modern scholars are of the opinion that some of the books of the Old Testament as they now stand in the received text of the Massorites are composed of several sources. A company of these scholars under the editorial supervision of Prof. Paul Haupt is preparing an edition, representing by various colors the component parts as well as the portions which they consider as later additions.

LEICESTER CODEX OF THE NEW TESTAMENT. Facsimile. Original preserved in the archives of the borough of Leicester, England.—It is written in cursive script (i. e., in a continuous running hand), and is usually ascribed to the eleventh century. In the opinion of Prof. J. Rendel Harris the manuscript is of Italian origin, and no earlier than the fourteenth or even the fifteenth century.

GREEK AND LATIN NEW TESTAMENT OF ERASMUS. (See plate 42.) Editio princeps. Printed by Frobenius in Basel, 1516.—The first complete book produced by the printing press was a Latin Bible in 1456. The Greek New Testament was first printed in the Complutensian Polyglot (so called from the Latin name of Alcala, Spain, where it was printed) of Cardinal Ximenes in 1514, but it was not issued until 1520. The edition of the Greek New Testament, by Erasmus, was, therefore, the first ever published, and became, with a few modifications, the received text printed by Elzevir in Leiden. Luther's translation was based upon it. To the Greek original Erasmus added a corrected Latin version with notes.

GREEK TESTAMENT. (See plate 43.) First American edition. Printed by Isaiah Thomas, 1800, Worcester, Massachusetts.

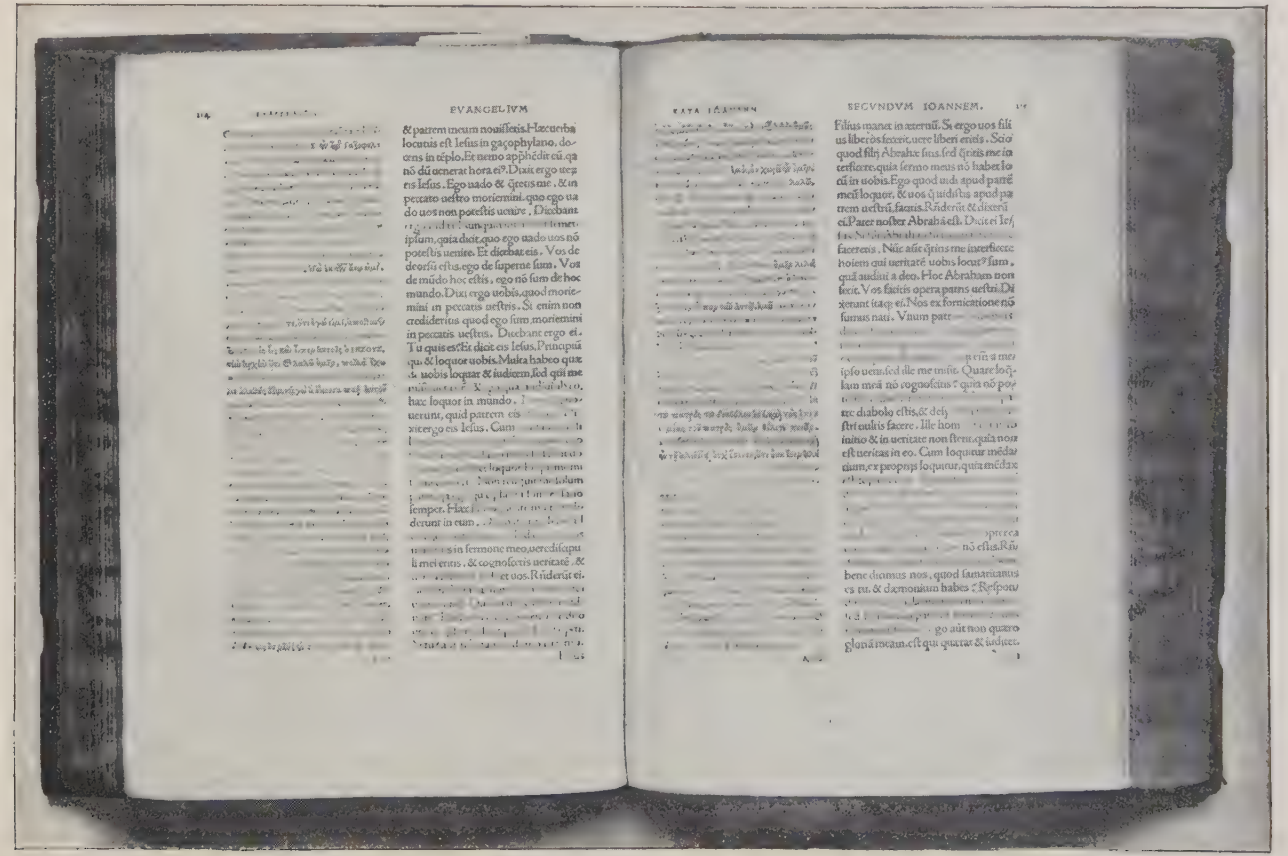
GREEK TESTAMENT. The second issued in America. Printed at Philadelphia by S. F. Bradford, 1806.

ANCIENT VERSIONS OF THE BIBLE.

Translations of the Scriptures became necessary when the Jews were dispersed in the Greco-Roman world and gradually abandoned the use of the Hebrew language, and later when Christianity was propagated among various nations. The oldest and most important version of the Old Testament, which in its turn became the parent of many other translations, is the Greek of Alexandria, known by the name of the Septuagint. The name Septuagint, meaning seventy, is derived from the tradition that it was made by a company of seventy (or rather seventy-two) Jewish scholars, at Alexandria, under the reign of Ptolemy Philadelphus, 285–247 B. C., who desired a copy for the library he was gathering. The truth of its origin seems to be that Alexandria became, after the Babylonian captivity, a center of Jewish

FIRST AMERICAN EDITION OF THE HEBREW BIBLE.

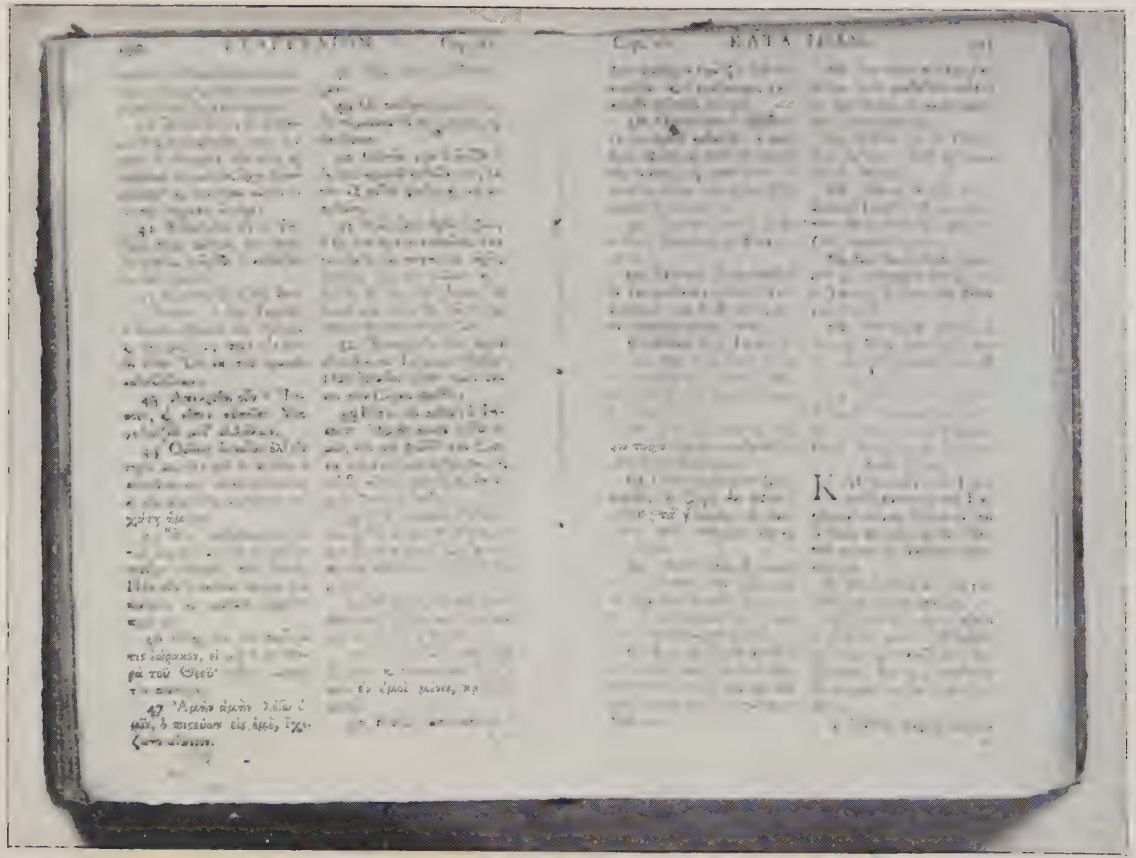
Cat. No. 155056, U.S.N.M. Deposited by Dr. Cyrus Adler.


EVANGELIVM
& patrem meum nouisseris. Hæc uerba
locutus est Iesus in gazophylano, do-
cens in templo. Et nemo apprehendit eū qa
nō dū uenerat hora ei⁹. Dixit ergo iterū
Iesus. Ego uado & quæretis me. & in
peccato uestro moriemini. quo ego ua-
do uos non potestis uenire. Dicebant
ipsum, quia dicit, quo ego uado uos nō
potestis uenire. Et dicebat eis. Vos de
deorsū estis, ego de supernis sum. Vos
de mūdo hoc estis, ego nō sum de hoc
mundo. Dixi ergo uobis, quod morie-
mini in peccatis uestris. Si enim non
crediderius quod ego sum, moriemini
in peccatis uestris. Dicebant ergo ei.
Tu quis es? Et dixit eis Iesus. Principiū
qu. & loquor uobis. Multa habeo quæ
de uobis loquar & iudicem, sed qui me
hæc loquor in mundo.
SECVNDVM IOANNEM.
Filius manet in æternū. Si ergo uos fili
us liberō fecerit, uere liberi eritis. Scio
quod filij Abrahæ sitis, sed quæritis me in
terficere, quia sermo meus nō habet lo
cū in uobis. Ego quod uidi apud patrē
meū loquor, & uos quæ uidistis apud pa
trem uestrū facitis. Responderunt & dixerū
ei. Pater noster Abraham est. Dicit ei Iesus
facietis. Nūc aūt quæritis me interficere
hominem qui ueritatē uobis locutus sum,
quā audiui a deo. Hoc Abraham non
fecit. Vos facitis opera patris uestri. Di
xerunt itaq; ei. Nos ex fornicatione nō
sumus nati. Vnum pat
ipso uenit, sed ille me misit. Quare lo
quelam meā nō cognoscitis? quia nō po
re diabolo estis, & desi
facere. Ille hom
initio & in ueritate non stetit, quia non
est ueritas in eo. Cum loquitur mēda
cium, ex propriis loquitur, quia mēdax
nō estis. Re
bene dicimus nos, quod samaritanus
es tu, & dæmonium habes? Respon
go aūt non quæro
glorificat eum, est qui quærat & iudicet.

GREEK AND LATIN NEW TESTAMENT OF ERASMUS (Gospel of John viii, 20–50).

Cat. No. 155087, U.S.N.M.

Report of U. S. National Museum, 1896.—Adler and Casarowicz.



FIRST AMERICAN EDITION OF THE GREEK NEW TESTAMENT.

Cat. No. 155059, U.S.N.M.

Report of U. S. National Museum, 1896. Adler and Casanowicz.

population. As time went on the Jews lost command of the Hebrew language and required a translation of their sacred books into Greek. The men who met this want differed very much in know edge and skill, were of an indeterminate number, and of different periods, beginning the work at the time of Ptolemy Philadelphus and ending it about 150 B. C. The Pentateuch is much more carefully translated than the rest of the Bible. Books now considered apocryphal were included in the canon. The Septuagint was used by the Jews until the second century of the Christian era, when they reverted to the Hebrew. It was also, no doubt, used by the Apostles and by the Church Fathers, who refer to it under the name of "Vulgata."

Targum or Aramean translation of the Old Testament. Parallel edition of the Pentateuch with the Hebrew text and various Hebrew commentaries, Vienna, 1859.—Targum, which means translation, is a name specifically given to the Aramean versions. They are supposed to owe their origin to the disuse of the Hebrew tongue by exiles in Babylon. They were at first oral, and arose from the custom of having the law read in Hebrew and then rendered by the official translator (*Meturgeman*, English dragoman) into Aramean. The best Targum is that which passes under the name of Onkelos, who lived about 70 A. D. It is, however, generally assumed that, in its present shape at least, it was produced in the third century A. D. in Babylonia. That ascribed to Jonathan ben Uziel, which originated in the fourth century A. D. in Babylon and is only extant on the Prophets, is more in the nature of an homiletic paraphrase, while the so-called Jerusalem Targum ("Pseudo-Jonathan") was probably not completed till the seventh century.

Facsimile of manuscripts of the Septuagint, ascribed to 300 A. D.—The original is an Egyptian papyrus now at Vienna. It consists of sixteen sheets written on both sides, and contains the greater part of Zechariah from the fourth chapter and parts of Malachi. It is written in uncial characters (capitals) and contains no divisions between the words.

Facsimile of the Codex Vaticanus, containing the Old and New Testaments, in six volumes. Rome, 1868–1881.—The Codex Vaticanus, so called from the fact that it is preserved in the Vatican at Rome, is the best and oldest Biblical manuscript now known. It is written in Greek, in uncial characters, and was probably the work of two or three scribes in Egypt during the fourth century. The original is probably the most valuable treasure of the Vatican Library. It was brought to Rome by Pope Nicholas V in 1448. The manuscript is not quite complete; there are a few gaps in the Old Testament, and the New Testament ends with Hebrews ix, 14.

Codex Sinaiticus. Facsimile edition, St. Petersburg. Four volumes, 1862.—The Codex Sinaiticus was discovered in 1859 by Constantine Tischenfort in the Convent of St. Catharine at the foot of Mount

Sinai. It was transferred to Cairo, then to Leipsic, and later to St. Petersburg, where it is preserved in the Imperial Library. His text was printed in Leipsic from types especially cast in imitation of the original and published at St. Petersburg at the expense of Czar Alexander II. The original is on parchment, written in uncial characters, four columns to a page, and forty-eight lines on a page. It dates from the middle of the fourth century. It contains the greater part of the Old Testament and the whole of the New Testament. Four different scribes were employed in its writing.

CODEX ALEXANDRINUS. Printed in type to represent the original manuscript. London, 1816.—This facsimile version of the Alexandrian or Egyptian text of the Bible appeared in 1816 in four volumes, Volumes I–III containing the Old Testament and Volume IV the New Testament. It contains the whole Bible, with the exception of a few parts. The original manuscript was presented to King Charles I by Sir Thomas Roe, from Cyril Lucar Patriarch, of Constantinople. It was transferred to the British Museum in 1753. It is written on parchment in uncials, without division of chapters, verses, or words. Tradition places the writing of this manuscript in the fourth century, but it is now generally assumed to date from the fifth century.

THE VULGATE OR LATIN BIBLE.—The Vulgate goes back to a Latin translation made from the Septuagint, in North Africa, in the second century, and known as the *Vetus Latina* or "Old Latin." A revised form of this translation was current in Italy toward the end of the fourth century, and was known as the Itala or "Italic." The present version, however, is due to St. Jerome (Hieronymus), and was made by him in Bethlehem between 383 and 404 A. D. It was for a long time the Bible of the Western Church and of a large part of the Eastern Church. St. Jerome began the revision of the Old Testament with the book of Psalms, of which he produced three copies known as the Roman, Gallican, and Hebrew Psalters. But of the rest of the Old Testament he made a new translation from the original Hebrew, with which he was well acquainted. The translation is commonly called the Vulgate, a name which was originally given to the Septuagint. It is still in use by the Roman Catholic Church. It was printed by Gutenberg between 1450 and 1455, being the first important specimen of printing with movable types.

SYRIAC OLD TESTAMENT. Edited by S. Lee and printed at London, 1823.—The oldest Syriac version of the Bible is the Peshitta ("correct" or "simple"), the most accurate of the ancient translations. It is referred to in the Commentaries of Ephraim the Syrian, in the fourth century, and was already at that time an old book.

The whole translation was made from the Hebrew, but the translators were free in their renderings, and seem also to have been acquainted with the Septuagint.

SYRIAC NEW TESTAMENT.—Printed at Hamburg, 1664.

ARABIC BIBLE.

Cairo, Egypt.

Cat. No. 152098, U S N.M. Deposited by Dr Cyrus Adler.

COPTIC NEW TESTAMENT.—Manuscript of the seventeenth century, Cairo, Egypt. Coptic was the language of the Egyptian Christians. It is a development from the ancient hieroglyphic language, with an admixture of Greek words, and continues to the present day to be used in the services of the Christian Church in Egypt. There were differences in the dialects spoken in different parts of the country, and so there are three Egyptian translations of the Bible—the Thebaic or Sahidic, the Memphitic or Bahiric, commonly called the Coptic, and the Bashmuric. They all probably date from the second century and are made after the Septuagint. The present manuscript contains St. Mark in the Bahïric dialect.

ETHIOPIC VERSION OF THE BIBLE.—Photograph of original Bible, preserved in the United States National Museum. This copy was obtained from King Theodore, of Abyssinia, by Lord Napier, and by him presented to General Grant. The Ethiopic version was made from the Septuagint in the fourth century, probably by Frumentius, the apostle of Ethiopia. It has forty-six books in all, containing, in addition to the Canon, a large number of Apocryphal books.

ARABIC VERSION OF SAADIA GAON.—In Hebrew characters. The Pentateuch, edited by J. Derenbourg, Paris, 1893. Saadia Gaon was born at Fayum, A. D. 892, and died in 942. His translation of the Bible is rather a paraphrase, and has a high exegetical value.

ARABIC BIBLE.—Manuscript. (See plate 44.) Complete Old Testament, neatly written and well preserved. Dated by scribe 1560, A. D. Cairo, Egypt.

ARABIC NEW TESTAMENT.—Contains the Epistles and Acts, the last five verses of the Acts wanting. Sixteenth century, Cairo, Egypt.

MODERN TRANSLATIONS OF THE BIBLE.

THE NEW TESTAMENT, TRANSLATED BY JOHN WYCLIFFE about 1380; printed from a contemporary manuscript by William Pickering, London, 1848. John Wycliffe was born in Yorkshire about 1320. He studied at Baliol College, Oxford, and was for some time master of that college. He became later rector of Lutterworth, in Leicestershire, and was the foremost leader of the reform party. He died in 1384. About 1380 he undertook, with the assistance of some of his followers, especially Nicholas Hereford, the translation of the entire Bible into English from the Latin of the Vulgate. It was the first complete English Bible. His translation was, after his death, revised by one of his adherents. The present copy is assumed to represent the first version prepared by Wycliffe himself, or at least under his supervision.

TYNDALE'S NEW TESTAMENT. Facsimile by F. Fry.—William Tyndale was born between 1484 and 1486 in Gloucestershire. He was educated at Oxford and afterwards at Cambridge. He went to Hamburg and later joined Luther at Wittenberg, where he finished the translation of the New Testament into English. The first edition was

issued in 1525. It was the first English translation made from the Greek, and it became the basis of all subsequent ones. It was also the first part of the Scriptures printed in the English language. In 1530 the translation of the Pentateuch was issued. His English style was very good and was largely retained in the Authorized version. His translation was condemned by the English bishops, and was ordered to be burned. Tyndale was strangled for heresy at Antwerp in 1536, and his body burned.

THE GOTHIC AND ANGLO-SAXON GOSPELS, with the versions of Wycliffe and Tyndale. Arranged by Rev. Joseph Bosworth, London, 1865.—The Gothic version was made in the fourth century by Bishop Ulfilas, born 318 A. D., died about 381. It is said to have been a complete version, with the exception of the Book of Kings. It was probably completed about 360 A. D. Only fragments are preserved in the so-called Codex Argenteus, or "Silver Book," in the library of the University of Upsala, Sweden. The Anglo-Saxon version was begun by King Alfred, who translated the Psalms in the ninth century. The translation now extant dates to the tenth century.[1]

COVERDALE'S BIBLE. Reprint by Baxter, 1838.—Miles Coverdale was born at Coverham, in the North Riding of Yorkshire, 1488. He died at Geneva in 1569. His Bible was issued October 4, 1535, being the first complete Bible printed in the English language. It was not translated from the original tongues, but was based chiefly on the Latin version and on Luther's Bible. It was undertaken at the wish of Thomas Cromwell, Earl of Essex, and dedicated to Henry VIII.

THE GENEVAN VERSION. Folio edition, printed at London, 1597.—This translation was made by English exiles during the reign of Mary, who took up their residence at Geneva. William Whittingham acted as editor, and his assistants were Thomas Cole, Christopher Goodman, Anthony Gilby, Thomas Sampson, and Bishop Coverdale. Some add John Knox, John Bodleigh, and John Pullain, and state that the translators consulted Calvin and Beza. The first edition was printed at Geneva in 1560. It was printed at the expense of John Bodley, father of the founder of the Bodleian Library in Oxford. It was the most popular Bible until superseded by the Authorized version, and was that brought to America by the Pilgrim Fathers. The division of chapters into verses, which had been introduced by Whittingham, from Stephanus's edition of 1551, was here for the first time adopted for the English Bible. The text of the Bible is accompanied by explanatory comments on the margin. It is sometimes called the "Breeches" Bible because of the substitution in Genesis iii, 7, of the rendering "breeches" for "aprons" of the other English version.

KING JAMES OR AUTHORIZED VERSION. Folio edition, printed at London by Robert Barker, 1613.—The preparation of a new English Bible was decided upon at a conference held at Hampton Court January

[1] For Wycliffe's and Tyndale's translations see above.

16 and 18, 1604. In that year King James I issued a commission to fifty-four eminent divines to undertake the work. It was not begun, however, until 1607, when seven of the original number had died. The forty-seven survivors were divided into six committees, two sitting at Oxford, two at Cambridge, and two at Westminster. In 1610 their work was completed, and then revised by a committee of six. Although universally known as the Authorized version, no record, either ecclesiastical or civil, has ever been found of such authorization. The first edition was printed by Robert Barker in 1611.

THE REVISED VERSION.—The increased knowledge concerning the original texts of the Scriptures, especially of the Greek New Testament, which resulted from the discovery of old manuscripts led to the desire for a revision of the Authorized version which was based upon the received text of Erasmus and Stephanus and exhibited many discrepancies from the emended original text. Such a revision was early advocated by men like Bishop Ellicott, Archbishop Trench, and Dean Alford. Efforts were also made from time to time in the House of Commons to have a royal commission appointed. In 1870 the upper house of the Canterbury Convocation, on the motion of Bishop Wilberforce, took the subject in hand and instituted the proceedings which finally secured the accomplishment of the work. In 1871 an American committee of cooperation was organized. The New Testament was completed in 1881 and the Old Testament in 1885.

PARALLEL NEW TESTAMENT. Revised version and Authorized version. (Seaside Library.) The Revised version of the New Testament appeared in England May 17, 1881, and in America May 20, 1881. The first half of the parallel Testament appeared in New York May 21 and the second half May 23.

THE NEW TESTAMENT, translated by Constantine Tischendorf, Leipzig, 1869. Volume 1000, Tauchnitz series.—This translation was based on the labors of Tischendorf in revising the Greek text, largely due to his discovery of the Sinaitic Codex. It points out many errors in the Authorized version, and undoubtedly paved the way for the Revised version.

LUTHER'S BIBLE. German translation, made by Martin Luther. Edition of 1554.—The New Testament appeared in 1522 and the Old Testament in parts between 1523 and 1532. The complete Bible appeared in 1534. Previous to Luther's version there were in use at least ten distinct German versions, literal translations of the Latin Bible. Luther worked from the original tongues, and yet succeeded in giving the Bible a real German dress and a style that would appeal to German readers. Luther's translation was of prime importance in assisting the progress of the Reformation, and is also the foundation of the German literary dialect.

SPANISH OLD TESTAMENT. Amsterdam, Holland, 1661 A. D. (5421 A. M.).—The first edition of this translation was printed in the middle

of the sixteenth century. It bears the title "The Bible in the Spanish language, translated word for word from the Hebrew, examined by the Inquisition, with the privilegium of the Duke of Ferrara." It is therefore generally known as the Ferrara Bible. The copies of this translation are divided into two classes—one appropriate for the use of the Jews, the other suited to the purposes of the Christians. The translation is extremely literal, and the translator has indicated with an asterisk the words which are in Hebrew equivocal, or capable of different meanings.

ELIOT'S INDIAN BIBLE. (See plate 45.) Facsimile reprint. Washington, D. C., 1890.—John Eliot, "the apostle of the Indians," was born in England in 1604 and received his education at Cambridge. In 1631 he removed to America and settled at Roxbury, Massachusetts, as minister, where he remained until his death, in 1690. He became interested in the conversion of the Indians of New England, whom he believed to be the descendants of the lost tribes of Israel, and determined to give them the Scriptures in their tribal tongue, which was the Natick dialect. He completed the translation of the New Testament in 1661 and that of the entire Bible in 1663. It was printed in Cambridge, Massachusetts, by Samuel Green and Marmaduke Johnson, "ordered to be printed by the Commissioners of the United Colonies in New England, At the Charge, and with the Consent of the Corporation in England For the Propagation of the Gospel amongst the Indians in New England."

Eliot's Indian Bible was the first ever printed in America, and the entire translation is stated to have been written with one pen. Eliot also published an Indian grammar and a number of other works, mostly relating to his missionary labors. The Natick dialect, in which the translation of the Bible was made, is now extinct.

MINIATURE BIBLE.—The smallest complete edition printed from type. Version of 1611.

CROMWELL'S SOLDIER'S POCKET BIBLE. Facsimile reprint. Compiled by Edmund Calamy and issued for the use of the army of the Commonwealth, London, 1643.—It has frequently been stated that every soldier in Cromwell's army was provided with a pocket Bible, and it was supposed that an especially small copy was used. In 1854 the late George Livermore, of Cambridgeport, Massachusetts, discovered that the Bible which Cromwell's soldiers carried was not the whole Bible, but the soldier's pocket Bible, which was generally buttoned between the coat and the waistcoat, next to the heart. It consists of a number of quotations from the Genevan version (all but two from the Old Testament) which were especially applicable to war times. Only two copies of the original of this work are known to be in existence—one in America and the other in the British Museum. The work was reissued in 1693 under the title "The Christian Soldier's Penny Bible." The only copy known to be extant is in the British Museum.[1]

[1] From the Bibliographical Introduction.

THE

HOLY BIBLE

CONTAINING THE

OLD TESTAMENT

AND THE *NEW*

Translated into the

INDIAN LANGUAGE

AND

Ordered to be Printed by the *Commissioners of the United Colonies* in *NEW-ENGLAND*.

At the Charge, and with the Consent of the

CORPORATION IN *ENGLAND*

For the Propagation of the Gospel amongst the Indians *in* New-England.

CAMBRIDGE:

Printed by *Samuel Green* and *Marmaduke Johnson.*

MDCLXIII.

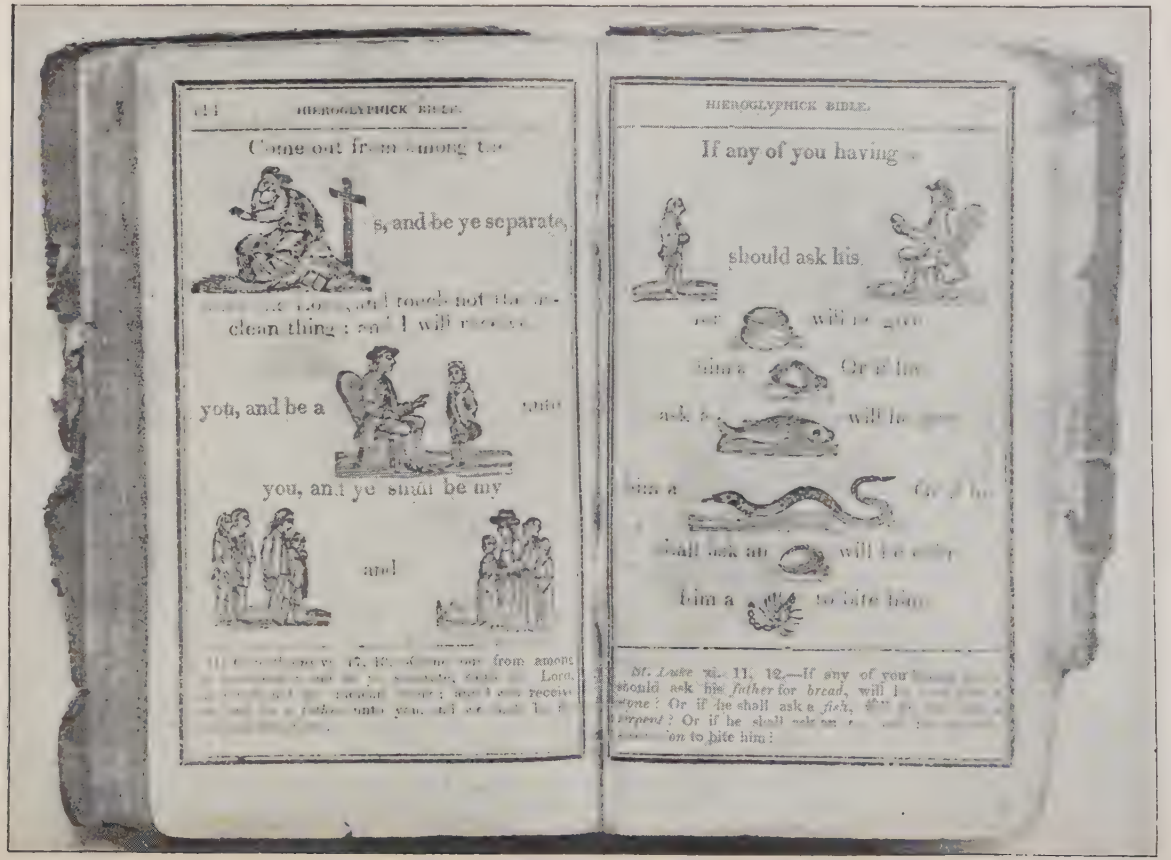
TITLE PAGE OF ELIOT'S INDIAN BIBLE.

HIEROGLYPHIC BIBLE. (See plate 46.) Published by Joseph Avery, Plymouth; printed by George Clark & Co., Charleston, 1820.—A number of hieroglyphic Bibles have been printed in America, the first being that of Isaiah Thomas, at Worcester, Massachusetts, in 1788. Words in each verse are represented by pictures, the whole being designed "to familiarize tender age in a pleasing and diverting manner with early ideas of the Holy Scriptures."[1]

BISHOP ASBURY'S TESTAMENT, with hundreds of the texts for his sermons marked in his own handwriting.—Francis Asbury, born in Staffordshire 1745, died in Virginia 1816, was the first bishop of the Methodist Church ordained in America. He was sent as a missionary by John Wesley in 1771, and in person organized the work of his denomination in the entire eastern portion of the United States, performed the first ordination in the Mississippi Valley, and in 1784 founded the first Methodist college.

THOMAS JEFFERSON'S BIBLE, consisting of texts from the Evangelists, historically arranged.—This book bears the title, "The life and morals of Jesus of Nazareth, extracted textually from the gospels, in Greek, Latin, French, and English." Four versions were employed. The passages were cut out of printed copies and pasted in the book. A concordance of the texts is given in the front and the sources of the verses in the margins. The section of the Roman law under which Jefferson supposed Christ to have been tried is also cited. All of these annotations, as well as the title page and concordance, are in Jefferson's own handwriting. Two maps, one of Palestine and another of the ancient world, are pasted in the front. Jefferson long had the preparation of this book in mind. On January 29, 1804, he wrote from Washington to Dr. Priestley: "I had sent to Philadelphia to get two Testaments (Greek) of the same edition, and two English, with a design to cut out the morsels of morality and paste them on the leaves of book." Nearly ten years later (October 13, 1813), in writing to John Adams, he stated that he had for his own use cut up the gospels "verse by verse" out of the printed book, arranging the matter which is evidently His (Christ's). In the same letter he describes the book as "the most sublime and benevolent code of morals which has ever been offered to man."

[1]The American editions are not described in W. L. Clouston's splendid work on Hieroglyphic Bibles.


HIEROGLYPHICK BIBLE.
Come out from among the
s, and be ye separate,
clean thing : and I will
you, and be a
you, and ye shall be my
and
HIEROGLYPHICK BIBLE.
If any of you having
should ask his
will he give
him a
Or if he
will he
him a
will he
him a
to bite him
St. Luke xi. 11, 12.—If any of you should ask his father for bread, will he give him a stone? Or if he shall ask a fish, will he give him a serpent? Or if he shall ask an egg, will he offer him a scorpion to bite him?

HIEROGLYPHIC BIBLE.

Report of U. S. National Museum, 1896.—Adler and Casanowicz.

THE LAMP OF THE ESKIMO.

BY

WALTER HOUGH, PH., D.,

Assistant Curator, Division of Ethnology, U. S. National Museum.

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THE LAMP OF THE ESKIMO.

By Walter Hough, Ph. D.,
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The completeness of the collection of Eskimo lamps in the National Museum, showing as it does examples from nearly every tribe from Labrador to the Aleutian Islands, renders it possible to treat them monographically.

This paper is one of a series in course of preparation under the general subject of heating and illumination from the standpoint of the ethnologist.

It is scarcely necessary to remark upon the inhospitable surroundings of the Eskimo or the rigor of the climate reflected in their cave-like houses. One is forced to recognize that in this region the need for warmth and light is only second to the prime need for food. This fact appears in the diet and clothing of the natives, in the nonconducting structure of the house, in the plan of the burrow-like entrance and in the height of the sleeping benches around the hut, which designedly or from instinct are so placed as to take advantage of the heated air collected under the ceiling. Thus Schwatka says that the "Netschillik Innuit, who inhabit the mainland opposite King William's Land, have the warmest *igloos* in the Arctic, as they are very low. The heat of the lamp and of the body keeps them very warm."[1]

At the same time there is a question whether the bodily temperature of the Eskimo is higher than that of the Europeans. Observations made at North Bluff on the Hudson Strait show that the mean temperature of the party in December and July was 98.1° and 97.7°, while that of the Eskimo for the corresponding dates was 100.2° and 98.4°.[2]

The observations of Dr. Green, of the *Thetis*, which prove that the summer temperature of the Eskimo differs little from the normal (98.4°), lead him to the conclusion that the latitude makes inappreciable difference in animal heat and that the nature of the food supply of the Eskimo is sufficient to counteract the effect of natural forces.[3] To

[1] F. Schwatka, Science, December 14, 1884, p. 544.

[2] W. A. Ashe, Science, X, July 29, 1889, p. 59.

[3] E. H. Green, The hygiene of the Eskimo, with some observations on the thermometer to determine their physiological norm. Medical News, Philadelphia, XLVII, 1885, pp. 505-507.

render the observations complete, however, the winter temperature of these Eskimo should be had for comparison.

Though the Eskimo live at a temperature of zero Fahrenheit, travelers have noticed their idiosyncrasy with regard to cold. The clothing is designedly left open at intervals around the waist and the bare skin exposed to the cold air. As a rule the Eskimo strip when in the house and sleep naked. Another indication of their feverishness is the consumption of great quantities of ice-cold water.

No explorer has failed to notice the Eskimo lamp, around which the whole domestic life of this people seems to focus. Far more remarkable than being the unique possessors of the lamp in the Western Hemisphere, the Eskimo presents the spectacle of a people depending for their very existence upon this household belonging. Indeed, it is a startling conclusion that the lamp has determined the occupancy of an otherwise uninhabitable region by the Eskimo, or, in other words, the distribution of a race.[1]

The extent to which the lamp has entered into Eskimo life as a social factor is very great. It is essentially the care and possession of the women, peculiarly a sign of the social unit, and though several families may inhabit the same *igloo* each maternal head must have her own lamp. "A woman without a lamp" is an expression which betokens, of all beings, the most wretched among the Eskimo. Dr. Bessels likewise remarks that the lamp is necessary for the existence of the female head of the family. The lamp is placed in the woman's grave.[2]

Dr. Bessels maintains that, in spite of Christianity and civilization, the Eskimo is not willing to part with the lamp; but as long as he is in possession of it he will be Eskimo in each one of his pulse beats, for where this lamp exists cleanliness is impossible.[2] Nansen also remarks upon the persistence of the lamp, even in houses in larger settlements, where Danish stoves are found. The soapstone cooking pots, however, have been superseded by iron pots.[3]

The high death rate among the Eskimo is attributed by Dr. Bessels to the carbon particles sent off by the lamp, which penetrate the air cells of the lungs.[2]

The excess of carbon dioxide and the general bad air of the huts must be very detrimental to health. In the spring when the thawing begins the huts are almost uninhabitable, but the people are compelled to stay in them, as it is too early to take to the tents. This is the time of greatest sickness. Hall relates that seventeen persons slept in a snow hut 10 feet in diameter. "In the morning, between the hours of 3 and 4, the men waked, ate a quantity of deer meat, smoked, and again

[1] The migration of peoples effected by the knowledge of making fire artificially will be discussed in another section of the general work.

[2] Dr. E. Bessels, Die Americanische Nordpol Expedition, Leipsic, 1879, p. 60.

[3] F. Nansen, The First Crossing of Greenland, II, p. 293.

went to sleep. At 5 the whole party were aroused to find that the lamp smoke during the night had covered them with soot." Hall waked with a severe headache from the "excess of carbonic acid gas generated by three fire lights and seventeen persons."[1]

Not the least value of the lamp to the Eskimo is the light which it affords. Simpson remarks that the Eskimo never seem to think of fire as a means of imparting warmth,[2] and Kane observes that their lamps are used for cooking, for light, for melting snow, and for drying clothes, rather than to warm the air.[3] Nevertheless, the lamp does afford considerable warmth, as Simpson admits in another place. Light, however, is highly necessary during the long darkness of winter and the darkness of the Eskimo dwelling. Nansen has several times remarked that the Eskimo do not sleep in the dark like other people.[4] Perhaps the inconvenience of rubbing out fire with the fire drill to relight the lamp is one reason. Likewise the feeling of companionship, security, or sociability given by light is appreciated by the Eskimo in common with all other human beings. These instinctive feelings determined in no small degree man's first overtures to his fire ally.

The lamp is not the sole fire of the Eskimo, for in a very few localities where fuel can be obtained fires are made in the open air or in the middle of the tent for cooking in summer. The fuel used is peat or guano furnished by gulls in East Greenland, or the Arctic willow, driftwood, or grass in other sections. In some places, though fuel can be obtained, it is not burned. However, the open fire is only an incident, and the whole[5] Eskimo race depend on the large lamps or oil burners made of stone which form part of the furniture of every hut.[6]

Kumlein describes a curious oven used at Cumberland Gulf. "In summer especially, when on hunting excursions, they very often 'fry' meat by making a little fireplace of stones and laying a flat piece of stone on top. The opening to receive the fuel supply is to windward. For fuel, at such times, they use *Cassiope tetragona* and *Ledum palustre;* these shrubs make a quick and very hot fire. It would be comparatively an easy task for these people to gather enough *Cassiope tetragona* during the summer to burn during the coldest weather, and not rely wholly on blubber."[7] The Eskimo hut may be likened to an inhabited oven with the lamp as its internal heat. The utilization of the heat is as complete as in the Samovar. The lamp is placed upon its support, above it hangs the

[1] C. F. Hall, Narrative of the Second Arctic Expedition, Washington, 1879, p. 135.

[2] John Simpson, Discoveries in North America, p. 346.

[3] E. K. Kane, Arctic Explorations, II, p. 202.

[4] F. Nansen, The First Crossing of Greenland, I, p. 341; II, p. 293.

[5] F. Nansen, *Idem*, II, p. 293; W. E. Parry, Second Voyage, London, 1824, p. 453; J. Murdoch, On Some Popular Errors in Regard to the Eskimo, American Naturalist, January, 1888, p. 13.

[6] T. Simpson, Arctic Papers, Roy. Geog. Soc., 1875, p. 236.

[7] L. Kumlein, Contributions to the Natural History of Arctic America, Washington, 1879, Smithsonian Institution, p. 20.

cooking pot, and above this, suspended from the ceiling, the frame of slats, network of thongs, or pegs, on which are placed articles to dry in the ascending warm air. Thus the lamp, which has a single function in other parts of the world, has added among the Eskimo that of the fireplace and cooking stove. The Eskimo lamp is classifically the homologue of the fireplace in the center of the houses among the majority of tribes in America and Asia.

Hans Egede gives the following description of the lamps of the Greenland communal houses: "Though ten or twenty train-lamps burn at once in the houses of the Greenlanders one does not perceive the steam or smoke thereof to fill these cottages. They take care in trimming the lamp, taking dry moss rubbed very small, which they lay on one side of the lamp, which, being lighted, burns very softly and does not cause any smoke if it is not laid on too thick or in lumps. This fire gives such a heat that it not only serves to boil their victuals, but also heats their rooms to that degree that it is as hot as a bagnio. But to those who are not used to this way of firing the smell is very disagreeable."[1] Parry, in his Second Voyage, presents a view of an Eskimo interior which shows in an interesting way the lamp and its appurtenances. (See plate 4.) It is described as follows:

The fire belonging to each family consists of a single lamp or shallow vessel of lapis ollaris, its form being the lesser segment of a circle. The wick, composed of dry moss rubbed between the hands until it is quite inflammable, is disposed along the edge of the lamp on the straight side, and in a greater or smaller quantity lighted, according to the heat required or the fuel that can be afforded. When the whole length of this, which is sometimes above 18 inches, is kindled, it affords a most brilliant and beautiful light without any perceptible smoke or offensive smell. The lamp is made to supply itself with oil, by suspending a long, thin slice of whale, seal or sea-horse blubber near the flame, the warmth of which causes the oil to drip into the vessel until the whole is extracted. Immediately over the lamp is fixed a rude and rickety framework of wood from which their pots are suspended, and serving also to sustain a large hoop of bone, having a net stretched tight within it. This contrivance, called *linnetat*, is intended for the reception of any wet things, and is usually loaded with boots, shoes, and mittens. The fireplace just described, as situated at the upper end of the apartment, has always, two lamps facing different ways, one for each family occupying the corresponding bedplace. There is frequently also a smaller and less-pretending establishment on the same model, lamp, pot, net, and all, in one of the corners next the door; for one apartment sometimes contains three families, which are always closely related, and no married woman or even a widow without children is without her separate fireplace.

With all the lamps lighted and the hut full of people and dogs a thermometer placed on the net over the fire indicated a temperature of 38°; when removed 2 or 3 feet from this situation it fell to 32°, and placed close to the wall stood at 23°, the temperature of the open air being at the time 25° below zero. A greater degree of warmth than this produces extreme inconvenience by the dropping from the roofs. This they endeavor to obviate by applying a little piece of snow to the place from which a drop proceeds, and this, adhering, is for a short time an effectual remedy; but for several weeks in the spring, when the weather is too warm for these edifices and still too cold for tents, they suffer much on this account.

[1] H. Egede, Greenland, London, 1745, p. 116.

The Eskimo stone pots for cooking are called *oot koo secks*. They are made in similar proportion, though of various sizes, corresponding with the dimensions of the lamp that burns under it. Suspended by a line of sinew at each end to the framework over the fire, smoke and oil blackens the stone. Cracked and mended with sinew or rivets of copper, iron, or lead make it quite water-tight.[1]

There is, however, another side to this picture. Lieutenant Schwatka relates that "the Kennepetoo Innuits (around Chesterfield Inlet, especially north of it) use few or no lamps to warm their snow huts, and despite the high beds and low roofs, they are cold, cheerless, and uncomfortable beyond measure. These Innuits are essentially reindeer killers and eaters and lay in an insignificant stock of seal oil to burn in their lamps. Walrus killing is unknown to them. For light they use a piece of reindeer suet laid beside a piece of lighted moss, all being on a large flat stone. The light of the stone lamp in all igloos where it is used is sufficient for all purposes of sewing and repairing. It is certainly equal to the light from three or four kerosene lamps, and with the white snow walls gives ample illumination."[2] The same authority writes that the U-quei-sik Salik Innuit around the mouth of Blacks River, who are salmon eaters, are another tribe that dispense with warming their snow houses for want of oil, but they use lamps for light.[3]

The Eskimo lamp has always been regarded a fixture of the house, subject only to the removals of the family. There are, however, small lamps which are carried by travelers or hunters on journeys whose use is primarily for light, but not less important as a means for lighting the indispensable pipe. This is probably the intent of all the small lamps in collections, except the quite small models, which are children's toys or those buried with the dead.

The Eskimo lamp is usually a shallow, elliptical vessel of stone, and infrequently of earthenware, clay, bone, or wood. This is perhaps determined by the prevalence of the proper material, and it will be seen later that pottery or clay lamps are found only on the low tundra of the Yukon Delta or St. Lawrence Island. Whenever soapstone can be had the lamp is invariably of that material, according to an old custom. Soapstone is easily carved, free from flaws, absorbs and retains heat, giving it up to melt the fat, to keep the oil fluid, and to supply the wick. Extraordinarily long journeys are made to secure soapstone. Dr. Boas[4] records that the Central Eskimo made journeys sometime lasting several years in quest of soapstone, which is found in a few places, and rarely in pieces large enough for the manufacture of lamps or pots. The same is true of localities in Alaska. Soapstone was thus one of the most prominent features of the trade and inter-

[1] W. E. Parry, Second Voyage, London, 1822, pp. 501, 502.

[2] F. Schwatka, The Igloo of the Innuit, Science, No. 31, p. 305.

[3] *Idem*, p. 304.

[4] Dr. Franz Boas, The Central Eskimo, Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 469.

course among the Eskimo tribes. The southern Eskimo of Alaska, notably at Kadiak and the Peninsula, made their lamps of very hard dioritic rock.

It is quite probable that the ancient lamps were fashioned with stone tools at the quarry, in order to save weight in transport. The Kadiak lamps mentioned above show plainly the marks of the stone hammer used in reducing them to shape by pecking. Substitutes for the lamp and cooking pot are sometimes made by Eskimo women from slabs of stone, which they cement together with a composition of seal's blood, clay, and dog's hair applied warm, the vessel being held at the same time over the flame of a lamp, which dries the cement to the hardness of stone.[1] In fact, a slab of stone, a piece of fat, and some moss for a wick form an extempore lamp on occasions.[2] In this view the rude Aleut lamps figured on plate 22 are such makeshifts. In connection with this, Nansen tells of an Eskimo who, being detained overnight on a journey, made a saucer serve as a lamp.[3] Frequently the lamp follows the outline of the original piece of soapstone, where the greatest possible reservoir capacity is required in the given slab.

Necessarily the lamp and cooking vessels are sometimes broken. Their repair is a good example of Eskimo ingenuity, effected by a cement of blood, clay, and hair, or a strong sewing of sinew. Several lamps and pots in the United States National Museum have been repaired by this method.

Seal oil is preferred for burning in the lamp, though any animal fat may be used. Capt. E. P. Herendeen informs the author that the Ootkiahviemute carry for trading, seal oil put up in pokes of the skin of the animal itself, prepared for the purpose. These skins so made up contain about 25 gallons of oil. The interior natives and river tribes are dependent upon the coast people for oil to burn in their lamps, as the small amount of fat which the reindeer yields is insufficient for the long arctic nights.

The lamp eats like a native; successful hunting means cheer and comfort in the hut of these sociable people during the winter. The economy of oil is often forced upon the Eskimo, for starvation and darkness is a frequent and near-by exigency. Schwatka says that he has known cases where the Eskimo were extremely anxious to economize oil needed to melt ice for drinking water, in which six or seven wells were dug through thick ice, before they gave up the attempt or were successful.[4] Every particle of fat is saved on principle.

The women scrape sealskins with a scoop of ivory, which is one of the accompaniments of the lamp.[5] There is also nearly always pro-

[1] Caleb Lyons, Private Journal, p. 320.

[2] C. F. Hall, Narrative of the Second Arctic Expedition, p. 75.

[3] F. Nansen, The First Crossing of Greenland, II, p. 221.

[4] F. Schwatka, The Implements of the Igloo, Science, IV, July 25, 1884, p. 84.

[5] O. T. Mason, Aboriginal Skin Dressing, Report U. S. Nat. Mus., 1889, plate LXXXI.

vision for saving the oil which may drop from the lip of the lamp. To keep the floor clean to prevent the lamp sinking into the snow, thus getting out the level and also conducting away the heat of the stone, a support is placed under it. This may consist of pegs of wood or pieces of bone stuck in the snow, a wooden block hollowed to catch the oil, or a block with three legs forming a stool. The forms will be figured later in the detailed description of the lamps by localities. No especial device for tipping the lamp in order to increase the supply of oil to the wick has been noticed. This is accomplished in a rude way by altering the position of the lamp on the supports, or by raising the rear support. Many lamps from their form incline toward the wick at a low angle. (See plate 17.)[1]

The oil is placed in the shallow reservoir and the supply is sometimes kept up by suspending a piece of blubber near the flame. The fat nearly always needs some preparation before being put into the lamp. This is effected among the Central Eskimo by beating the blubber to break up the fat globules, allowing the oil to come out as soon as it is melted. In summer the blubber is chewed and ejected into the lamp.[2]

The woman's knife or *ulu* and the fat scrapers which have been the subjects of two valuable papers by Dr. O. T. Mason, are closely associated with the feeding of the lamp.

The *ulu* is employed for cutting or mincing the blubber and the scoop or scraper for removing the fat from the inner surface of the skins. It is also used to transfer the fat to the lamp. The oil is allowed to stand level with the lower edge of the wick. The latter is made by rolling compact dried sphagnum moss, willow catskins, or peat between the palms with a small quantity of fat. Women often carry little bags of the prepared moss.[3] The line of wick is applied in an even ridge along the straight edge of the lamp, which varies in length from 2 to 30 inches in different localities. This may be seen by contrasting the wide lamp of the far north with those of the south at Kadiak and the middle region, which have a very narrow lip. This seems to be due to the smaller need for light in the south, where the arctic night is not so long. However, Asiatic or other influence to the west may be the cause. Sometimes the wick is laid for only a portion of the length when only a small flame is required. Lamps with partitions adjusted and fastened in with cement are found at Point Barrow. Sometimes a large lamp is reduced to five concavities by low septums in order to increase the length of the wick edge when extra flame is needed. The care of the lamp is quite an acquirement. The wick must be dense or

[1] A piece of skin is often placed under the lamp as a "catch all." Many lamps from various countries are made double for this purpose.

[2] Dr. Franz Boas, The Central Eskimo, Sixth Annual Report of the Bureau of Ethnology, 1884–85, p. 545.

[3] The Greenland Eskimo used a wick of asbestus, thus forestalling the modern indestructible wick. W. E. Parry, Second Voyage, London, 1822, p. 51.

the lamp will smoke, and it must be kept in order by means of a trimmer, which is a small piece of bone, stone, or wood. The trimmer dipped in oil forms a torch on occasion.[1]

Dr. Bessels says that the wick is ignited at one end and the flame skillfully guided with the trimmer across the whole length of the edge. If the quickly charring wick extends too far into the flame, too much heat is taken away from it and it burns with a deep, red light and its external edge is not hot enough to consume the carbon particles which spread themselves as sooty clouds in the hut.[2]

Lamp trimming only reaches perfection in the old women of the tribe, who can prepare a lamp so that it will give a good, steady flame for several hours, while usually half an hour is the best that can be expected.[3] In an Eskimo tradition[4] a woman takes down some eagle's feathers from a nail in the wall and stirs up the smoking lamp, so as to make it burn brightly.

While, as a rule, the Eskimo lamp has a shallow, plain, reservoir, simply for holding oil, there are modifications of the reservoir of considerable interest. Some lamps of Cumberland Gulf, of East Greenland, of West Greenland, and Point Barrow have a raised portion or step at the rear of the reservoir; probably blubber to be melted gradually is placed upon it. Other lamps have a low ridge just front of the wick edge and parallel with it. This ridge either breaks down at the extremities, allowing the oil to flow around to the wick, or it is perforated or divided by deep cuts into two or three sections for the same purpose. The office of this ridge is to regulate the flow of oil to the wick and to prevent any sudden wash of oil carrying away the wick line. It is apparent that the lamps from St. Lawrence Island (see plate 14) could readily be carried about in the hand if necessary.

The lamp found by Gen. A. W. Greely in the high north has the ridge. Curiously enough it reappears in St. Lawrence Island, in Bering Strait, and among the Chukchis. A trace of the ridge is found in East Greenland and in Kadiak Island. These permanent ridges may have some connection with the septums fitted in the lamp of Point Barrow. There is no evidence, however, that they have been used as extra wick edges, as in the case of the Barrow lamps.

The saucer-shaped pottery lamps of the Yukon tundra have no provision for the wick around the edge. Some specimens appear to have been lighted on the edge, and Mr. Nelson assures the writer that this method is followed.

Most observers have spoken in terms of praise of the excellent light given by the Eskimo lamp. The flame in a well-trimmed lamp is from

[1] The name for torch is *nanerut*, or *nanernag*. The only other locality where the name is found is on the Mackenzie River, where it is called *nenexeron*. The use of the torch is extremely uncommon among the Eskimo.

[2] Dr. E. Bessels, Die Americanische Nordpol Expedition, Leipsic, 1879, p. 60.

[3] F. Schwatka, The Implements of the Igloo, Science, IV, July 25, 1884, p. 85.

[4] Dr. Henry Rink, Tales and Traditions of the Eskimo, London, 1875, p. 326.

1 to 2 inches high, very clear and steady. The oil and fat of the northern animal furnish illuminants of the best quality. In the snow houses of the east the white walls reflect the light, adding to its power.

The administration of lighting for public use is very uncommon among the Eskimo, as it was among civilized peoples until recently. Occasionally there is a demand for an increase of light for the illumination of places of assembly where shamanistic or other practices are being carried on.

In an ivory model of skillful workmanship from Nushagak, southern Alaska, exhibited in the United States National Museum, representing a wrestling match in a summer tent, there is a curious chandelier, consisting of two dish lamps placed on the ends of a crossbar and secured by strings to another parallel bar some distance above, the whole being suspended from the framework of the tent by cords. The lamps have each a tube, which being painted red at the end seem to represent a single wick. This chandelier is unique (fig. 1).

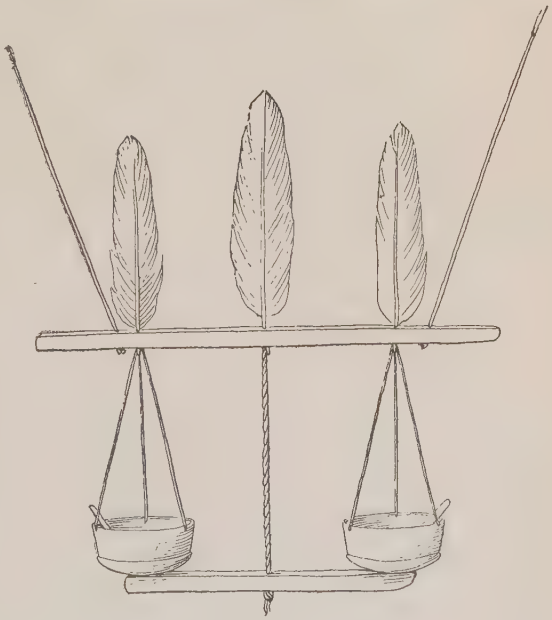


Fig. 1.
HANGING LAMP.
Nushagak, Alaska.

Another lamp rest, consisting of a crosspiece resting on an upright post, having a lamp fixed at either end is found in a drawing by a native named Namoff from Kadiak. The lamp is represented as illuminating a shaman's lodge.[1]

Long years of misapprehension render it almost useless to combat the popular idea that the Eskimo are by preference eaters of raw flesh. Mr. Murdoch[2] has pointed out that the Eskimo sometimes eat flesh raw, especially in a frozen state; in the region where fuel is very scarce this habit appears to have become fixed. The Eskimo when hunting or on a journey and the Eskimo at home are different persons as to habits. In the hut the pot hanging over the lamp always con-

[1] G. Mallory, Tenth Annual Report of the Bureau of Ethnology, p. 507, fig. 714.

[2] John Murdoch, Popular Errors in Regard to the Eskimo, American Naturalist, January, 1887, p. 15.

tains food cooking for the family, and it is the woman's business to keep it going. On ordinary occasions the Eskimo prefers cooked food, for his digestive tract does not differ from that of other members of the human family. Improper eating produces similar effects upon him as upon more civilized people. When food is plenty it is true there is great feasting, and it would seem in the absence of intoxicants the torpor produced by gorging is the only method the Eskimo has of reaching the Nirvana of the civilized. It has been observed that the drinking of pure oil is not practiced with impunity by the Eskimo, who as a rule only take it as medicine.

Kumlein[1] is sufficient authority for the statement that "when the Eskimo have been simmering meat, especially seal, in their boiling pots, they pour off the liquor and mix it with about an equal quantity of blood; this makes a thick and rather greasy soup that must be quite nourishing; the children are very fond of it. It seems possible that from this dish has originated the popular error that these people drink oil, a notion that is simply preposterous.

Fig. 2.
SNOW MELTER.
Anatoak.
(After Kane.)

The Eskimo drink great quantities of water. It is curious that with its world of congealed water the Arctic should be a veritable Sahara. Water is usually supplied by melted snow or ice and the lamp is brought into requisition for the purpose, though sometimes the warmth of the hut is sufficient, especially if the vessel containing snow is placed near the flame. Dr. Kane figures a snow melter of considerable ingenuity which is reproduced here (fig. 2). Sometimes travelers carry water-tight pouches containing snow, which they put under the clothing to be melted by the heat of the body.[2] Mr. Astrup thus describes a method of melting ice for drinking water: "At the side of the lump of meat stood also a block of ice as clear as a crystal, whence the community obtained water, as in the center of it a cavity had been cut, at the bottom of which a stone was placed about the size of a man's fist, on which there burned with a good flame a piece of moss intersected with the blubber, and as the ice melted at the sides of the cavity the water collected at the bottom in a small, clear pool, whence it was consumed by the many parched mouths by sucking it up through hollow reindeer marrow bones."[3]

[1] L. Kumlein, Nat. Hist. of Arctic America, Report Smithsonian Institution, 1879, pp. 20, 21.

[2] E. K. Kane, Arctic Exploration, I, p. 381.

[3] Edwin Astrup, In the Land of the Northernmost Eskimo. Littell's Living Age, No. 22701, from Fortnightly Review.

The lamp and its accompanying pot usually agree as to size, the rule being that the length of the pot shall be equal to the length of the wick edge. The drying frame is larger, owing to the size of the articles to be laid upon it, and also because the warm air above the lamp spreads out.

In the huts of hunting parties out on the tundra a skin is hung around the lamp and frame, to better focus the heat for the very necessary drying of the wet garments.[1]

The rack or net hung over the lamp points out another very important feature of the Eskimo domestic economy. Mittens, boots, and other articles to be dried are put on the rack preparatory to their manipulation and softening by the women. The rack is often made by lashing slats of wood together, or, where wood is scarce, a hoop of wood or bone, crossed by netting, is found. The rack is supported from the ceiling or from the side of the hut, and from it the pot is usually suspended. The rack, however, is not found south of the Arctic circle among the western Eskimo where sticks are driven into the walls, taking the place of the rack.

The value of the lamps in the arts is very great. First in importance is the bending of the wood for snowshoes, boxes, etc., which is accomplished by dipping the wood in water and steaming it over the lamp. Superior work of this kind is done, as the snowshoes and wooden vessels in the United States National Museum bear witness. Ivory, antler, and bone are also bent over the lamp, after a preliminary soaking in urine.[2] Skins are dried in tanning over the lamp by the Eskimo of Cumberland Gulf. The hardening of the peculiar Eskimo cement has been mentioned. There are doubtless many other applications by which the lamp enters into the arts.

It is not remarkable that the lamp enters also into the religion and folklore of this simple people; there is, however, very little recorded on the subject. Franz Boas has collected the most information on this point, which is presented in his valuable work on the Central Eskimo.[3] In burial, the man's hunting implements are placed by his side; the pots, lamps, knives, etc., by the side of the woman, and by the child, its playthings.[4] Hall observed on a grave a small kettle hung over a lamp. A model of a lamp from a grave in Cumberland Gulf is figured by Dr. Boas and the United States National Museum possesses several from graves in Greenland. This custom has been observed in other localities. The small oblong stones which were found by the late Baron Nordenskjold in northwest Greenland graves and which were lamp

[1] Point Barrow region. Supplied by Capt. E. P. Herendeen.

[2] This is the process in southern Alaska, the writer is informed by Henry Elliott. Mr. Nelson makes the same statement for the villages farther north.

[3] Dr. Franz Boas, The Central Eskimo, Sixth Annual Report of the Bureau of Ethnology, 1884–85.

[4] The Eskimo bride always brings with her a knife, ooloo and a stone lamp. Rink, Tales and Traditions of the Eskimo, London, 1875.

trimmers or rather ordinary torches, may be viewed in this light. Abandoned lamps may be due to the superstition which renders useless the articles in a hut rendered *taboo* by a death. The low burning lamp is also an adjunct of the wizard's incantations.

In the United States National Museum there is a dance mask of wood in the shape of a human face, surmounted by a rude carving intended to represent the spirit of the Sandhill crane (*Grus canadensis*). In the head of the crane is a small cavity made to receive a stone oil lamp, the light from which produces a weird effect during the dance. The spirit is visible only to the shaman or sorcerer. The mask is from Rasboinsky, Alaska (Lower Yukon.)[1]

The constellation of the Great Bear is called by the East Greenlanders *pisildlat*, lamp foot or stool upon which the lamp is placed.

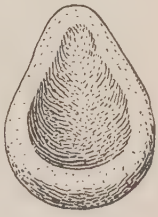
The typical lamp is that whose form is the result of an attempt to devise a vessel with a long, nearly straight wick edge combined with a reservoir. This necessarily throws the vessel into the clam-shell shape or ellipsoidal shape. Lamps of this character appertain to the high and rigorous north, where the maximum of heat and light are required. No doubt, also, the lamp is modified by the abundance or scarcity of the food supply and the prevalence of driftwood. This form ranges from Labrador to Norton Sound, Alaska. The other general form of lamp, which is circular or ovate, having a narrow wick edge, ranges south from Norton Sound. They are circular and of baked clay on the tundra formed by the alluvial deposits of the Yukon and Kuskokwim river systems. They become oval and of stone in the metamorphic and igneous country to the southeast and southwest through the Alaskan Peninsula and Aleutian Chain. There is a connection of form suggested between the stone lamps spoken of and the stone vessels of the northwest coast of Alaska and British Columbia and the west coast of North America, but there is no connection by use. The Eskimo are unique in the Western Hemisphere in the possession of a lamp.

The clay-saucer lamp of the Yukon tundra is interesting from the fact that it seems an intrusion. It may be true that the alluvial country furnishes no stone, and hence clay is substituted, which will account for the material. The Eskimo will go a long distance, as has been pointed out, for material which he needs and has been accustomed to use. The lamps of St. Lawrence Island, though of pottery and aberrant in form, preserve the long wick line of the Arctic lamp. The shape of the Yukon type, the absence of a definite wick edge or lip, and the method of burning by a wick brought up at the side relate them to the lamps of eastern Asia, or the simple dish lamps of diverse ages and peoples. Kennan speaks of a dish lamp with the wick floating in the oil in the house of the Koraks. The quotation may prove interesting: "The temperature of a Korak tent in winter seldom ranges above 20° or 25° F., and as constant exposure to such a degree of cold would be

[1] No. 49020, U.S.N.M., collected by E. W. Nelson.

at least very disagreeable the Koraks construct around the inner circumference of the tents small, nearly air-tight apartments, called 'pologs,' which are separated one from another by skin curtains and combine the advantages of exclusiveness with the desirable luxury of greater warmth. These 'pologs' are about 4 feet in height and 6 or 8 feet in width or length. They are made of the heaviest furs sewed carefully together to exclude the air, and are warmed and lighted by a burning fragment of moss floating in a wooden bowl of seal oil."[1]

The typical forms of Eskimo lamps are shown on plate 24. Thrown together in this way they furnish at a view the gradation of forms throughout the whole Eskimo area.



The range of the lamp southward from the Aleutian Islands is limited. The only information that a lamp of any description was in use among the Northwest Coast Indians was given the author by Captain Chase, who visited Cape Flattery and Vancouver Island in 1850. Captain Chase says that these Indians used a lamp made from the clam shell, and burned whale blubber or porpoise oil in them, with a bark wick.

Dr. Franz Boas informs the writer that the Indians of Vancouver often throw oil on the fire from a bottle when they desire more light. Mr. Lucien M. Turner also states that when the Aleuts require more heat they place the bowlder lamp on the ground and lay a piece of cloth or shreds of grass in the oil and light it, getting a larger flame.

Figs. 3, 4.

OLD STONE LAMP (*crusie*); STONE MATRIX IN WHICH IRON WAS HAMMERED TO FORM *crusies*.

Scotland.

From Trans. Roy. Scottish Soc. Arts, XII, Pt. 1.

The lamps of northern Europe and Asia, examined with a view of ascertaining the affiliations of the lamps of the Eskimo, give little data for conclusions. There were mediæval stone-grease lamps in use in northern Europe above the oil line, so named by Dr. Taylor. The only example known by the writer is from Scotland and was figured by D. Bruce Peebles.[2] This lamp (fig. 3) is curiously like those of the Alaskan Peninsula. In the present state of the inquiry it seems the Eskimo lamp forms a homogeneous group differing in administration from any other lamps in the world, the peculiar heritage of this people and necessary to their welfare.

The conclusions reached are that the Eskimo before he migrated from his priscan home had the lamp, this utensil being a prerequisite to migration into high latitude; that one of the most important functions of the lamp is for melting snow and ice for drinking water; that the lamp is

[1] George Kennan, Tent Life in Siberia, New York, 1881, p. 175.

[2] Trans. Royal Scottish Society of Arts, XII; Pt. 1.

employed for lighting, warming, cooking, melting snow, drying clothes, and in the arts, thus combining in itself several functions which have been differentiated among civilized peoples.

That the architecture of the house is related to the use of the lamp. The house is made nonconducting and low in order to utilize the heated air.

That the lamp is a social factor, peculiarly the sign of the family unit, each head of the family (the woman) having her lamp.

That the invention of the lamp took place on some seacoast, where fat of aquatic mammals of high fuel value was abundant, rather than in the interior, where the fat of land animals is of low fuel value.

That the typical form of the lamp arises from an attempt to devise a vessel with a straight wick edge combined with a reservoir giving the vessel an obovate or ellipsoidal shape.

Finally, from observation of lamps from numerous localities around the Eskimo shore line, it is concluded that lamps in low latitude, below the circle of illumination, are less specialized than those of higher latitudes. For instance, the lamps of southern Alaska have a wick edge of 2 inches, while those of Point Barrow and northern Greenland have a wick edge of from 17 to 36 inches in width.

It becomes possible, then, to say with some certainty the degree of north latitude to which a lamp appertains, light and temperature being the modifying causes. Driftwood, the fuel supply, and the presence or absence of material from which to construct the lamp must also be considered. The cause of the large lamp coming down so far in latitude on the east is on account of the dipping of the isotherms. The lamps of Labrador are the case in point.

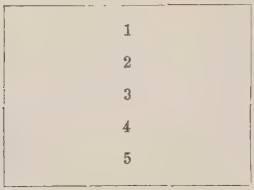
DISTRIBUTION AND FORMS OF THE ESKIMO LAMP.

There are three kinds of Eskimo lamps with regard to use. They may be called the house lamp, the traveler's or summer lamp, and the mortuary lamp, the latter frequently being models. Lamps for melting snow may also be mentioned.

The summer lamp is based on a number of specimens which are too large for models or toys, but are of convenient size for carrying on the person. They usually bear marks of use as a lamp. Capt. J. O. Spicer, of Groton, Connecticut, has presented a fine example of this kind of lamp to the United States National Museum, and describes its use in the summer when the large house lamp is not necessary and the small lamp supplies light for the pipe. Travelers often carry such lamp for use on journeys.

The larger regions embracing the localities from whence the lamps come which are described in this monograph are Labrador, Cumberland Gulf, Greenland, Mackenzie River, Point Barrow, Kotzebue Sound, St. Lawrence Island, Eastern Siberia, Norton Sound, the Yukon Delta

EXPLANATION OF PLATE 1.



LAMPS OF LABRADOR.

Fig. 1. Outline, section and front view.
(Cat. No. 90167, U.S.N.M. Ungava. Collected by L. M. Turner.)

Fig. 2. Lamp in rest with accompanying cooking pot and drying frame.
(Cat. Nos. 90013, 90257, 90235, U.S.N.M. Ungava. Collected by L. M. Turner.)

Fig. 3. Outline section and front view.
(Cat. No. 90256, U.S.N.M. Ungava. Collected by L. M. Turner.)

Fig. 4. Large house lamp in forked support.
(Cat. No. 90251, U.S.N.M. Ungava. Collected by L. M. Turner.)

Fig. 5. Same in support of four pegs.

LAMPS OF LABRADOR.

and region north of Bristol Bay, the Alaskan Peninsula and Kadiak Island, and the Aleutian Chain. The typical outlines from the various regions are presented on plate 24.

THE LAMPS OF LABRADOR.

The lamps of Labrador are invariably of soapstone, which is secured by long journeys into the interior. There are two types, one long and narrow, the other broader; the back is bowed, the ends truncated, the bottom deep, forming a ridge, the section an obtuse angle formed by the junction of two planes; the edges and ends are squared and the wick-edge is straight.

Some of the house lamps are very large. They are never balanced, depending upon supports for adjustment as to position. Smaller lamps for personal use are often balanced.

The drying frames are semilunar, consisting usually of a bowed hoop joined at the ends to a bar and the intervening space netted or crossed with thongs, as in a tennis racket. The frame takes this shape on account of its being supported by pegs driven into the wall of the circular house.

The cooking pots are oblong and heavy, with flat bottom, the walls slanting inward. Grummets for the suspending cords are fastened through holes drilled at the corners.

The Labrador lamps in the United States National Museum were all collected by Mr. L. M. Turner, who visited the country in 1883–84. His account, edited by Mr. John Murdoch, may be found in the eleventh annual report of the Bureau of Ethnology, where excellent figures may be examined in connection with this monograph.

Toy lamp. Soapstone, neatly made, forming a model of the broader type. Length, 2¼ inches; width, 1 inch. Eskimo of Ungava, Labrador. Collected by L. M. Turner. 3523.

Toy lamp. Soapstone, rudely cut out. Length, 1⅛ inches; width, ⅛ inch. Eskimo of Ungava, Labrador. Collected by L. M. Turner. 63909.

Small lamp. Made of soapstone, elliptic in shape, truncated at the ends, following the Labrador form. This lamp has seen service, and it is without doubt a personal lamp used by travelers and hunters. Length, 3⅞ inches; width, 2 inches; height, 1 inch. Eskimo of Ungava, Labrador. Collected by L. M. Turner. 90167. Plate 1, fig. 1.

Toy lamp. Soapstone; of the usual form of the broad type. Length, 3½ inches; width, 2 inches. Eskimo of Ungava, Labrador. Collected by L. M. Turner. 90013. Plate 1, fig. 2.

Small toy lamp. Soapstone, skillfully cut out. Length, 1⅝ inches; width, nine-sixteenths of an inch. Eskimo of Ungava, Labrador. Collected by L. M. Turner. 90254.

Toy lamp. Soapstone; finely finished; long, subtriangular form with truncate ends. Wall at back; straight wick edge; reservoir with curving median line. Length, 3⅞ inches; width, 1¼ inches. Eskimo of Ungava, Labrador. Collected by L. M. Turner. 90256. Plate 1, fig. 3.

Lamp. Of soapstone, semilunar; uniform outline with truncated ends. The reservoir is smoothly worked out, the wick edge nearly straight. This lamp is accu-

rately balanced on a very small rounded base area, standing, when placed on a plane surface, in position for burning with a reservoir full of oil. Hence a stand for this lamp is not necessary. This adjustment of the center of gravity has been observed in a number of Eskimo lamps. Length, 17⅛ inches; width, 7⅞ inches; height at back, 4 inches; front, 3¾ inches. Eskimo of Ungava, Labrador. Collected by L. M. Turner. 90014.

STONE LAMP, *ko-thlik*. Large lamp of soapstone; crescentic outline with truncated horns. The bottom takes the form of the reservoir, which slopes sharply down from the straight wick edge to the lowest point and then at a low slant to the curved back, not exhibiting the sharp angle demarking the two planes shown in the small lamps. The wick edge curves very slightly. Around the back and ends a squared edge is worked out. This lamp, which may be taken as the type, must, of necessity, be set in a support of such figure as to incline it forward in order to supply oil to the wick. This is done by placing the lamp on an excavated block of wood or notched sticks. No attempt has been made to smoothly finish this lamp. Length, 20¾ inches; width, 9¼ inches; height, 4 inches. Eskimo of Ungava, Labrador. Collected by L. M. Turner. 90251. Plate 1, figs. 4, 5.

COOKING POT. Large, heavy, oblong vessel of soapstone, rather crudely made. The slanting walls are thick and bulged; the bottom is flat. At each of the upper corners blind holes are drilled to meet each other in the thicker walls of the end of the pot, forming an eyelet for the thongs used in suspension of the vessel. Length, 13 inches; width, 8¼ inches; height, 4⅝ inches. Eskimo of Ungava, Labrador. Collected by L. M. Turner. 90257. Plate 1, fig. 2.

COOKING POT. Oblong pot, skillfully made of soapstone. The sides are thick, slightly convex, and slant toward the opening; the bottom is flat. At each of the four upper corners a slanting hole is drilled, coming through on the side. Whalebone strips for suspending the pot are passed through the holes and a knot made in the end to secure it. Length, 11½ inches; breadth, 5½ inches; height, 4 inches. Eskimo of Ungava, Labrador. Collected by L. M. Turner. 90015.

MODEL OF DRYING FRAMES. The drying frame (90235, Plate 1, fig. 2) consists of a strip of dressed pine wood bent into semilunar shape and mortised at the ends into a cross bar. The interspace is crossed with horizontal and vertical strips of rawhide passing through holes in the frame. The support upon which the drying frame rests is formed of two sharpened stakes lashed together at right angles at the larger ends. This support is fixed in the wall of the snow house. The frame, 90236 not figured, is made of a round stick bent into semilunar shape and crossed with netting of string. Length, 7¼ inches; width, 4¼ inches. Eskimo of Ungava, Labrador. Collected by L. M. Turner. 90235, 90236.

The lamp supports shown in the lower figures on plate 1 are copies of specimens in the Toronto University Museum, from East Maine, Labrador. They consist of two notched sticks, wedge-shaped at the lower ends for driving into the ground, or of four sticks cut diagonally at the top so placed as to form an equivalent to the notch.

The support in fig. 2 on plate 1 is of wood, hollowed out to receive the lamp.

THE LAMPS OF CUMBERLAND GULF.

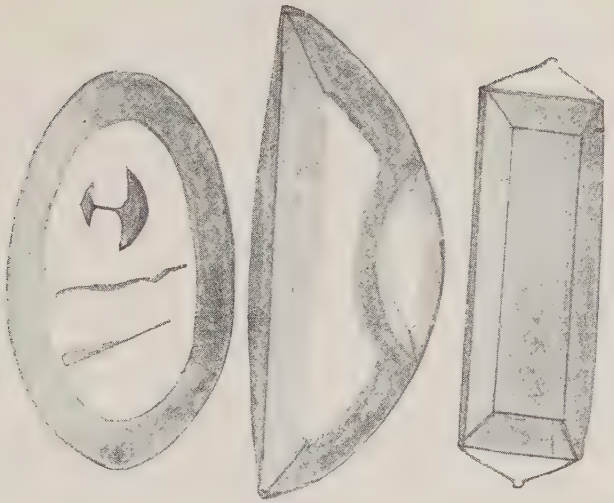
There is a close resemblance between the lamps of Cumberland Gulf and those of Labrador. The former, however, are narrower and more pointed, the outline viewed from above being elliptic. The material is usually soapstone and the workmanship is excellent. Some of the house lamps are quite large, having a wick edge nearly 2 feet long.

EXPLANATION OF PLATE 2.

LAMPS OF CUMBERLAND GULF.

Fig. 1. Pencil drawing by Eskimo of lamp and accompaniments.
(Cumberland Gulf. Collected by L. Kumlein.)

Fig. 2. Front view, outline and section of a small lamp with pocket.
(Cat. No. 29968, U.S.N.M. Cumberland Gulf. Collected by Lieut. W. A. Mintzer, U. S. N.)



LAMPS OF CUMBERLAND GULF.

Upon the authority of Capt. J. O. Spicer, of Groton, the class of summer lamps for this locality has been designated. These are small lamps for summer use to furnish light for the pipe and to start fires. The small lamp figured on plate 2, fig. 2, is interesting. It may be compared with the Greenland specimen on plate 7.

The cooking pots are like those of Labrador. No drying frame exists in the United States National Museum from Cumberland Gulf.

DRAWING IN PENCIL. Lamp, pot, dish, woman's knife for cutting fat, wick trimmer, and a filament of sphagnum moss for the wick; drawn by an Eskimo of Cumberland Gulf. Collected by L. Kumlein. This drawing is very interesting, as showing adjuncts to the lamp, which usually escape the collector. There is, for instance, no wick-trimmer in the large lamp collection of the United States National Museum and the use of the knife and fat scraper in the care of the lamp was not known until it was noticed by Professor Mason in his paper on "Skin dressing." See Plate 2, fig. 1.

SMALL STONE LAMP, WITH POCKET. Excavated from soapstone, crescentic in outline. It is balanced on a rounded base, tipping with ease from front to back, but not from side to side. The reservoir is deep, and at the rear a pocket is formed, demarked by a curving wall. The wick edge slants rather sharply down to the floor of the reservoir. The intent of the pocket at the rear is not known; in this specimen it forms a convenient place for insertion of the thumb in removing or carrying the lamp. The specimen is very neatly finished. In the popular account of Dr. Kane's explorations a lamp of this variety is figured. Length, 3⅝ inches; width, 1⅝ inches; height, ¾ inch. Eskimo, Cumberland Gulf, Canada. Collected by Lieut. W. A. Mintzer, U. S. N. 29968. Plate 2, fig. 2.

SUMMER LAMP. Of soapstone, semilunar in outline. The shape of the reservoir is triangular, being formed by the meeting of the planes of the back and wick edge at the middle like those of Ungava Bay, Labrador. The bottom is rounded as are all edges. The balance of the lamp is remarkable, the center of gravity causing it to assume the position required for supplying oil to the wick, although resting upon a small, rounded base when moved. Laterally the lamp is stable, antero-posteriorly it moves freely for tipping. The balance is intentional, and this feature is found in several other localities. The name summer lamp denotes its use in summer, when the large house lamp is not necessary and the small lamp supplies light for the pipe, etc. Length, 7½ inches; width, $3\frac{3}{16}$ inches; height at back, 3¼ inches; at front, ¾ inch. Eskimo, Cumberland Gulf, Canada. Collected by Capt. J. O. Spicer. 168994. Plate 3, fig. 1.

STONE LAMP. Roughly hollowed out from amphibolite, elliptic in shape with rounded ends. The bottom follows the curves of the reservoir, which shows a median groove formed by the junction of the planes of the wick portion and rear portion of the lamp. The lamp is not self balancing and hence must have a support. The wick edge is considerably curved. Length, 20 inches; width, 9 inches; height, when level, 3¼ inches. Eskimo, Cumberland Gulf, Canada. Collected by Lieut. W. A. Mintzer, U. S. N. 29964. Plate 3, fig. 2.

STONE LAMP. Large, elliptic lamp, neatly excavated from soapstone. It is very deeply hollowed out, the wick edge nearly straight and smoothly worked. Not being balanced, the lamp requires support. At the ends of the lamp below are slight projections, probably for the reception of forked supports like those in use at East Maine. This fine lamp has seen long service, being saturated and glazed with oil. Length, 23 inches; width, 8¼ inches; height when level, 5 inches. Eskimo, Cumberland Gulf, Canada. Collected by Lieut. W. A. Mintzer, U. S. N. 29965. Plate 3, fig. 3.

LAMP. Semilunar lamp of soapstone; reservoir deep, walls abrupt, bottom nearly flat. The wick edge has a gentle curve. The back of the lamp, which rose

higher than the wick edge, has been broken away, and the specimen shows marks of long usage. The bottom is flat and irregular. From the height of the wick edge the lamp must have required to be strongly tipped toward the front when in use. Length, 12¼ inches; width 6 inches; height, 1¾ inches. Eskimo, Cumberland Gulf, Canada. Collected by Lieut. W. A. Mintzer, U. S. N. 29966.

SMALL LAMP. Made of soapstone, crescentic in outline, with truncated horns. The reservoir is neatly hollowed out, the rear wall forming a low rim. The lip or wick edge slants rather abruptly to meet the plane of the floor, forming an angle near the front of the lamp (see section) as in the lamps of Labrador. The bottom of the lamp is rounded, and has irregular cavities due to foreign substances in the soapstone. This lamp, from its small size, is probably one used by travelers or in summer. It is not balanced, and hence requires a rest or foot. Length, 7½ inches; width, 4 inches; height, 1¼ inches. Eskimo, Cumberland Gulf, Canada. Collected by Lieutenant Mintzer, U. S. N. 29967. Plate 3, fig. 4.

SOAPSTONE POT. Oblong in shape, cut out of soapstone. It is pierced at the corners for suspension. The bottom is flat; the sides incline inward, thus making the opening smaller at the top. This cooking pot in every respect resembles those collected by Mr. L. M. Turner in Labrador. The specimen has been broken and mended with cement and sinew by the natives. Length, 12½ inches; width, 7 inches; height, 3¾ inches. Eskimo, Mantilik, Cumberland Gulf, Canada. Collected by Lieut. W. A. Mintzer, U. S. N. 29969. Plate 3, fig. 5.

STONE POT. Similar in form to No. 29969. The specimen has been mended with whalebone strips. Eskimo, Cumberland Gulf, Canada. Collected by Lieut. W. A. Mintzer, U. S. N.

THE LAMPS OF GREENLAND.

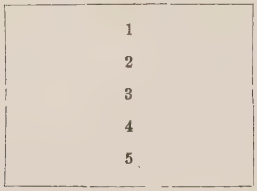
The lamps of Greenland are made of soapstone and other harder rocks. They are usually elliptic in outline or having the outline of the gibbous moon. The bottom is nearly always flat or slightly curved, as they are placed on stools; sometimes, however, they are set up on pegs. There is little relation in form between the Greenland lamps and those of Labrador or Cumberland Gulf (Baffin Land). The relation is rather between Greenland both east and west and northwestern Alaska. The type of shell-shaped lamps of North Greenland, shown on plate 7, have the same relationship and pass over to Eastern Siberia by way of Saint Lawrence Island. (See plates 4 to 9.)

The cooking pot has walls inclining outward, in reverse to those of the south. Perhaps the finest specimen of soapstone work of the kind in existence is the cooking pot brought from Smith Sound by Dr. Hayes. (See plate 9, fig. 3.)

The drying frame of East Greenland is hung over the lamp, as is the frame used in a tent at Inglefield Gulf (Smith Sound). (See plate 9, fig. 1.) In other localities the frame is placed on pegs driven in the wall over the bench upon which the lamp is installed. Wick trimmers are often a stick of asbestos or pointed piece of soapstone. In East Greenland it is a chisel-shaped piece of iron mounted in a wooden handle. A number of mortuary lamps have been found in South and East Greenland.

The view of the interior of an Eskimo snow house in Greenland is interesting, as showing the method of setting up the all-essential lamp

EXPLANATION OF PLATE 3.



LAMPS OF CUMBERLAND GULF.

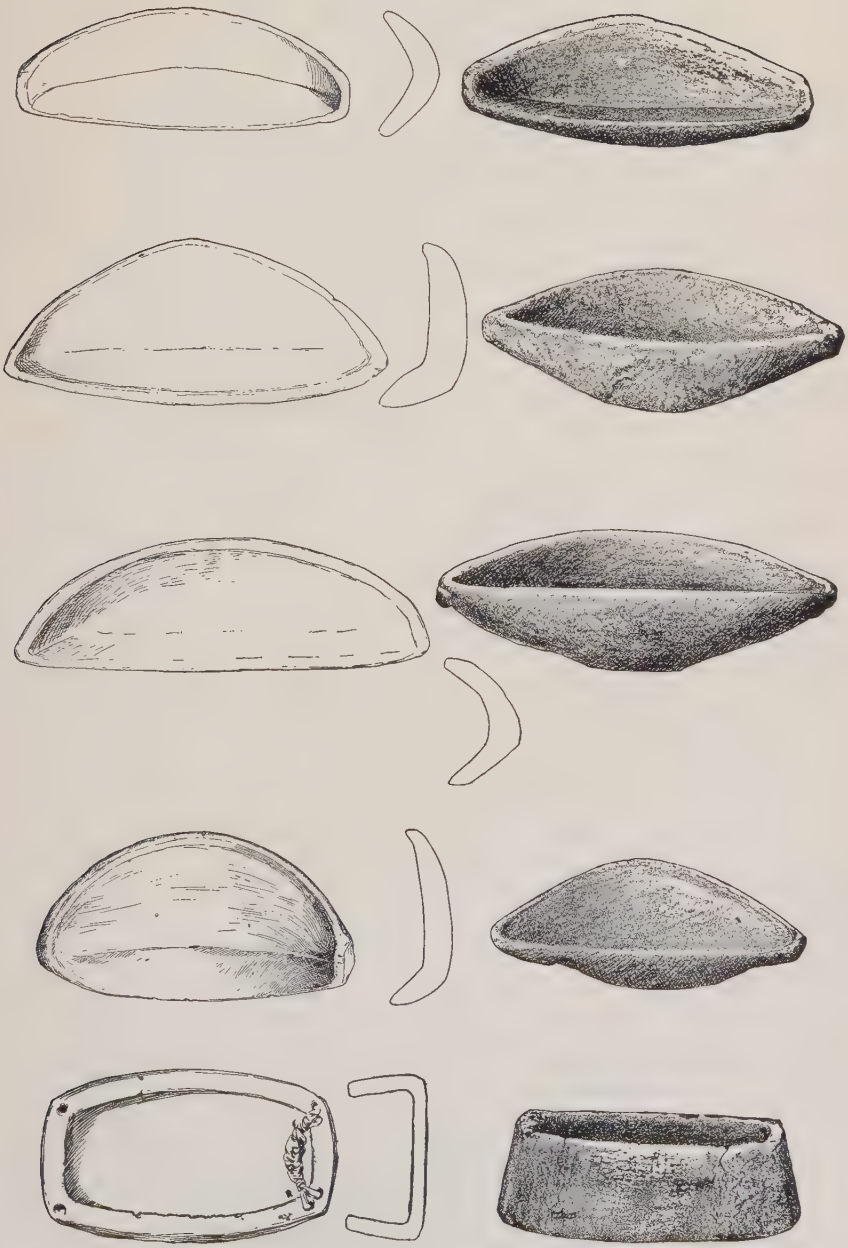
Fig. 1. Outline, section, and front view of summer lamp.
(Cat. No. 168994, U.S.N.M. Cumberland Gulf. Collected by Capt. J. O. Spicer.)

Fig. 2. Outline, section, and front view of house lamp.
(Cat. No. 29964, U.S.N.M. Cumberland Gulf. Collected by Lieut. W. A. Mintzer, U. S. N.)

Fig. 3. Typical house lamp.
(Cat. No. 29965, U.S.N.M. Same locality and collector.)

Fig. 4. Small lamp.
(Cat. No. 29967, U.S.N.M. Same locality and collector.)

Fig. 5. Cooking pot.
(Cat. No. 29969, U.S.N.M. Same locality and collector.)



LAMPS OF CUMBERLAND GULF.

with its accessories. It also emphasizes the strait caused by the almost total lack of wood, bones, antlers, etc., being employed instead. A snowshoe apparently is made to do duty as a drying frame. Attention is called to the drip-catcher under the lamp, and the fat suspended by a thong over the heat of the flame. (See plate 4.)

LAMP. Of soapstone; very large and worked out very neatly, the result being a lamp of elegant shape. The bottom is flat and the sides nearly vertical. The reservoir is nearly flat and slopes gradually up to the wick edge, while the rear wall is high. The wick edge curves more than is usual in Eskimo lamps. The lamp has been broken and repaired neatly with sinew and cement. Length, 26½ inches; width, 13⅛ inches; height at front, 2¼ inches; at back, 3½ inches. Eskimo, Repulse Bay. Collected by Capt. C. F. Hall. 10439. Plate 5, fig. 1.

STONE LAMP. Excavated from soapstone, the wick edge slightly curved, the back bowed, forming a shell-shaped dish. The lamp seems to show traces of having been worked with stone tools. The rear wall is nearly vertical; the reservoir neatly hollowed out, being deepest in the middle, gently sloping up to the lip and to the rear. A shallow groove has been cut along the inner margin of the lip, for convenience in installing the wick. The stone is worked thin and resembles pottery. The lamp is probably one used in summer or in traveling. It is wider than the Cumberland Gulf type. Length, 7 inches; width, 4½ inches; height, ⅞ inch. Eskimo, Smith Sound. Collected by Dr. I. I. Hayes. 176064. Plate 5, fig. 2.

LAMP. Of hard stone, smoothly worked out, the corners and edges rounded. The wick edge is curved at the ends; the intervening portion nearly straight. The bottom is rounded and the lamp inclines toward the wick edge. In outline it has the shape of the gibbous moon. This specimen seems to have been taken from an old village site. Length, 8½ inches; width, 5⅛ inches; height at rear, 2½ inches; at front, 2⅛ inches. South Greenland. From the Royal Museum of Northern Antiquities, Copenhagen. 45845. Plate 5, fig. 3.

SMALL STONE LAMP. Cut from soapstone; roughly elliptic in outline; the bottom flat, heavily scored by the cutting implement. The sides slant upward and outward; the reservoir is deep, the bottom flat, the walls slanting outward. The wick edge is strongly curved, hence the wick seems to have been supplied with oil, only at the middle portion. This is probably a summer or traveling lamp from South Greenland. Length, 6 inches; width, 3¾ inches; height at front, 1½ inches; at rear, 2 inches. Eskimo, South Greenland. From the Royal Museum of Northern Antiquities, Copenhagen. 45844. Plate 5, fig. 4.

MODEL OF LAMP AND COOKING POT. Made by Mik-sang-wah, native of the village of Karnah, 77° 20′ N. 70° W. These natives are called the most northern Eskimo. Inglefield Gulf, Greenland. Peary Auxiliary Expedition, 1894. Henry G. Bryant. 175705. Plate 6, fig. 1.

LAMP. Large lamp of soapstone, well finished. It is elliptic in outline, the bottom and floor of the reservoir flat, the wick edge thick and lower than the sloping back. Length, 17 inches; width, 7 inches; height at back, 2 inches; at front, 1½ inches. Eskimo of Itah, Smith Sound, Greenland. Collected by Dr. Emil Bessels. 126745. Plate 6, fig 2.

STONE LAMP. Rudely excavated from sandstone, probably from a concretion. The edges are broken and worn down, the bottom is rounded but the lamp balances. In general shape it follows the South Greenland type, the character and hardness of the material and its evident age have modified its appearance. Length, 7⅝ inches; width, 5 inches; height, about 2¾ inches. Eskimo, Greenland. Collected by Dr. I. I. Hayes. 504. Plate 7, fig. 1.

LAMP. Of soapstone, neatly worked out, somewhat in the shape of a clam shell, or having the outline of an obtuse equilateral triangle. It is accurately balanced

in a slanting position and readily tips forward. The walls are thin, the reservoir deeply hollowed out and crossed near the front third by a high bridge pierced near the middle at the floor of the reservoir. The large cavity at the rear of the lamp cut off by the bridge is for the reception of blubber to be melted by the heat of the lamp, and the oil supply to the wick passes through the orifice in the bridge. Length, 8¼ inches; width (front to back), 7⅜ inches, height at front, 1⅝ inches; at back, 4 inches. Eskimo of South Greenland. From the Royal Museum of Northern Antiquities, Copenhagen. 45846. Plate 7, fig. 2.

Lamp. Large lamp made from coarse crystalline rock, triangular in outline, the bottom flat, the sides rounded, the back much higher than the wick edge. The reservoir is flat and is crossed by a bridge, which breaks down at the ends, allowing the passage of the oil to the wick. The wick edge is curved and is rough from age and use. This lamp is evidently very old. It was probably taken from a village site in a high latitude as it resembles closely the lamp found by General Greely in latitude 82 degrees north. (See Plate 7, fig. 3.) Length, 14½ inches; width, 12½ inches; height, at front, 2 inches; at rear, 5½ inches. Eskimo, North Greenland. From the Royal Museum of Northern Antiquities, Copenhagen. 45847. Plate 7, fig. 4.

Lamp (from grave). Small lamp, rudely cut from soapstone upon Greenland model. It has been in actual use and it is probable that it is a personal lamp, which has been buried with its owner in or on the grave where it was found. (For East Greenland mortuary lamps, see Plate 8, fig. 1.) Length, 3¼ inches; width, 1⅞ inches; height, ⅞ inch. Eskimo, South Greenland. Collected by Governor Feucker. 63908.

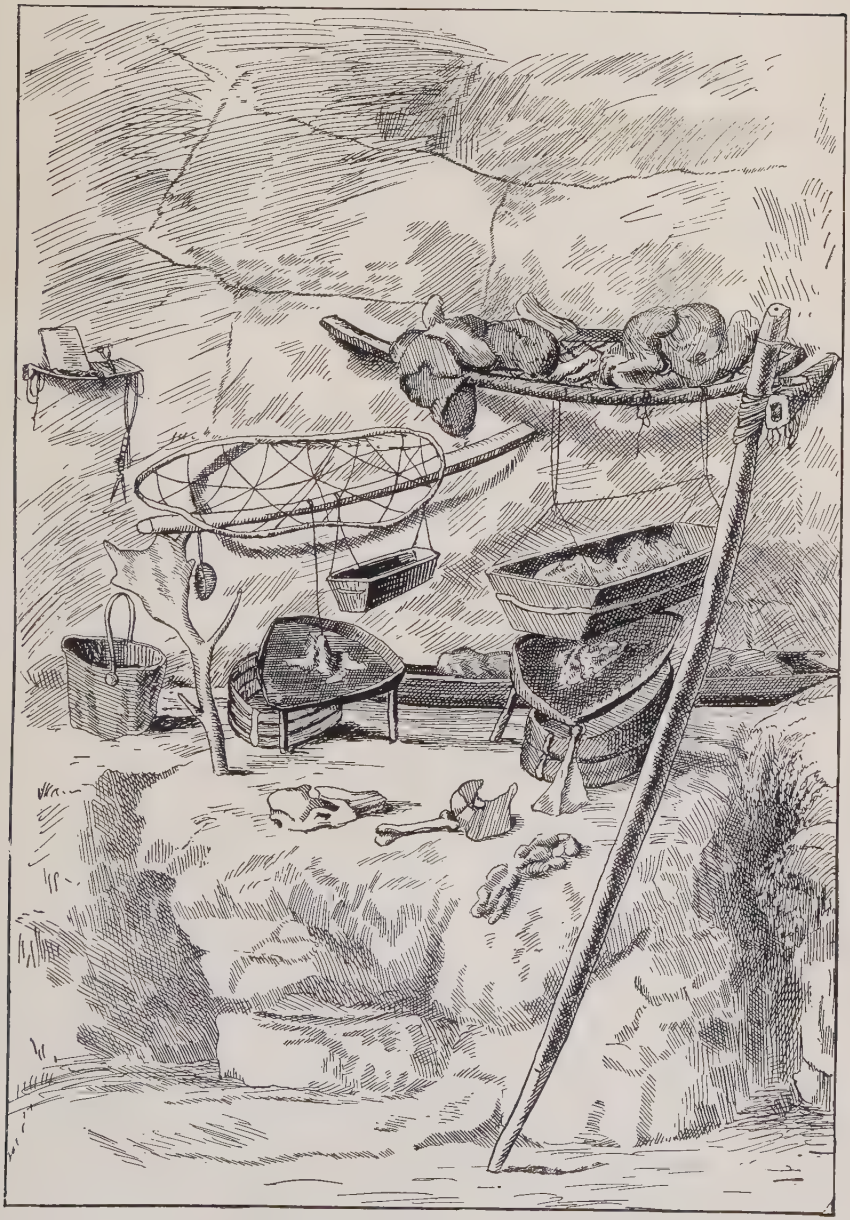
Small lamp (model). Made of soapstone for Dr. Hayes. South Greenland. Collected by Dr. I. I. Hayes. 176065. Plate 8, fig. 2.

Lamp. Of soapstone, ovate in outline; reservoir slants regularly from wick edge to the bottom of low back wall; the convex wick edge has a ridge running around it between the outer edge and the reservoir, forming a groove in which the wick was installed. The lamp rests upon a flat bottom and stands level, the rim of the back wall being of the same height as the wick edge. Length, 8 inches; width, 5 inches; height, 2¼ inches. Eskimo, East Greenland. Collected by Capt. Gustav Holm. From the Royal Museum of Northern Antiquities, Copenhagen. 168942. Plate 8, fig. 3.

Soapstone pot. With rounded ends and flat bottom; oblong. The wall flares outward from the base, and in the four corners holes are drilled through which are passed the ends of seal-skin cords secured by knots. These loops are for suspension of the pot over the lamp 168942. The pot is neatly finished and the sides tolerably thin. Length, 8 inches; width, 4¾ inches; height, 4 1/16 inches. Eskimo of East Greenland. Collected by Capt. Gustav Holm. From the Royal Museum of Northern Antiquities, Copenhagen. 168943. Plate 8, fig. 3.

Moss for wick. Dense mass of moss, *sphagnum* sp., from which the wick for the lamp is prepared. The moss is usually prepared by rubbing between the palms of the hands at the same time incorporating a little oil. This powdered moss is kept in a bag or other receptacle for subsequent use. Eskimo, East Greenland. Collected by Capt. Gustav Holm. From the Royal Museum of Northern Antiquities, Copenhagen. 168944.

Drying frame for lamp 168942. Oblong frame made up of thirteen rounded, parallel strips of pine wood cut out with a knife, mortised into crossbars at either end and secured by pegs. The ends of the crossbars project beyond the slats. This frame is supported by bars from the walls of the hut and from it the pot (No. 168943) hangs over the lamp. Length, 16½ inches; width, 13⅞ inches. Eskimo, East Greenland. Collected by Capt. Gustav Holm. From the Royal Museum of Northern Antiquities, Copenhagen. 168941. Plate 8, fig. 3.



INTERIOR OF AN ESKIMO SNOW HUT.

(After Parry.)

EXPLANATION OF PLATE 5.

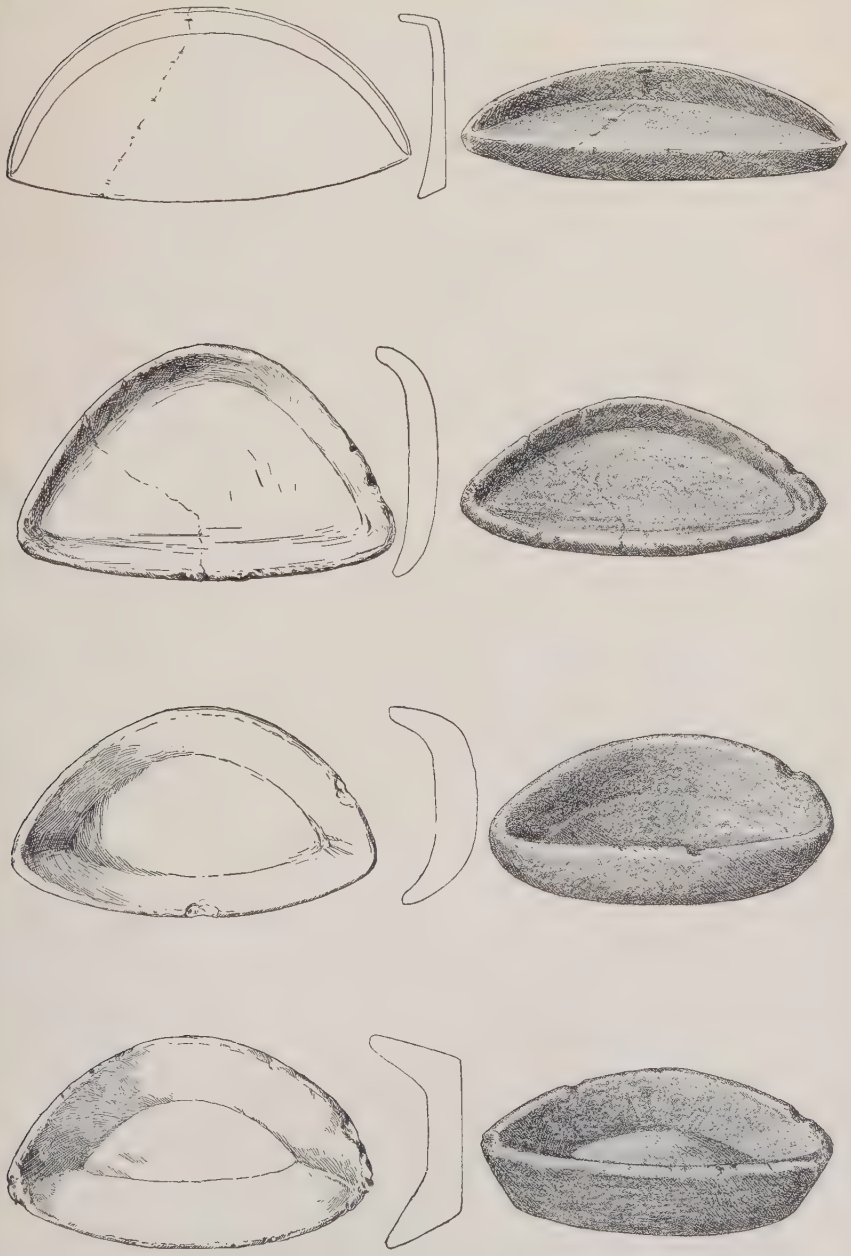
LAMPS OF GREENLAND.

Fig. 1. Outline, section, and front view of large lamp.
(Cat. No. 10439, U.S.N.M. Repulse Bay. Collected by Capt. C. F. Hall.)

Fig. 2. Small lamp.
(Cat. No. 176064, U.S.N.M. Smith Sound. Collected by Dr. I. I. Hays.)

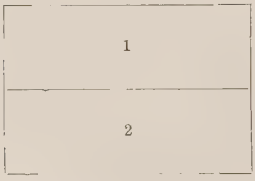
Fig. 3. Lamp of hard stone.
(Cat. No. 45845, U.S.N.M. South Greenland. Royal Museum, Copenhagen.)

Fig. 4. Small lamp.
(Cat. No. 45844, U.S.N.M. South Greenland. Royal Museum, Copenhagen.)



LAMPS OF GREENLAND.

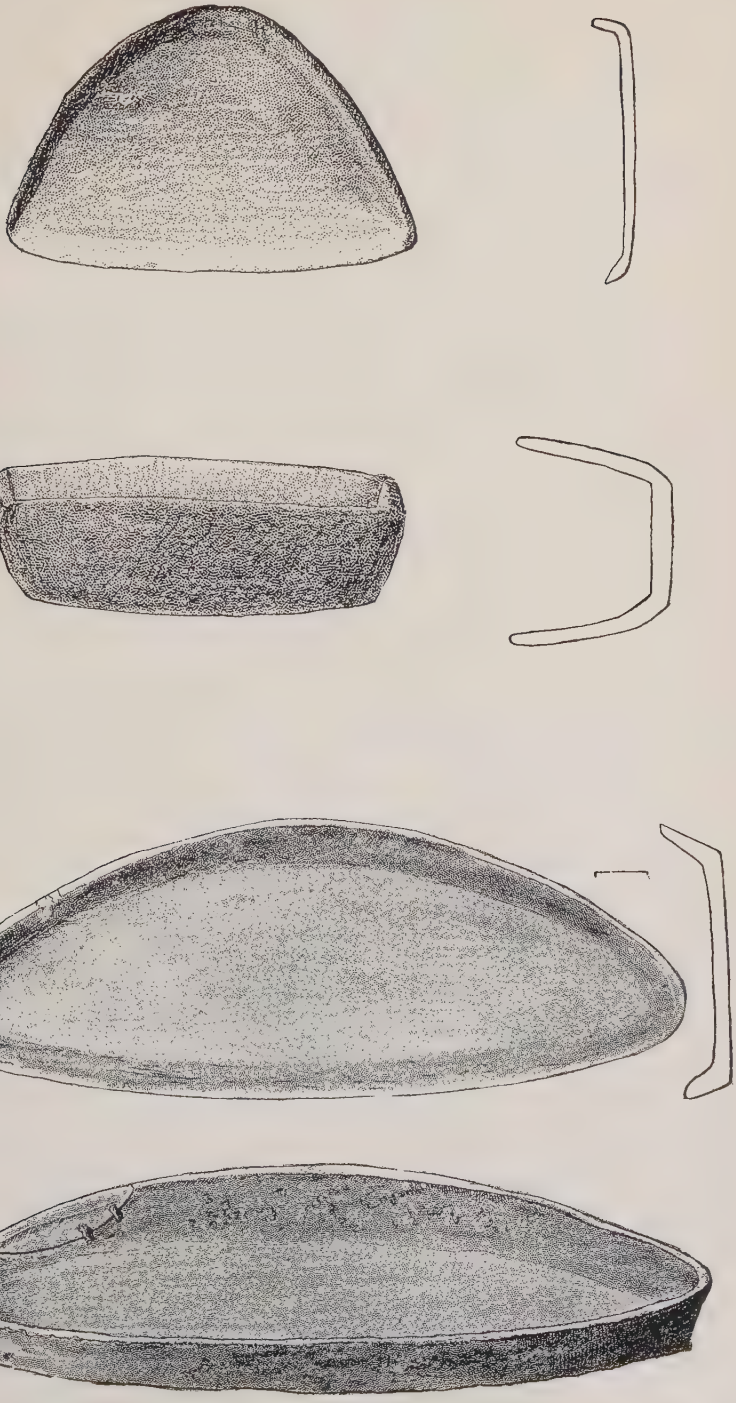
EXPLANATION OF PLATE 6.



LAMPS OF GREENLAND.

Fig. 1. Model of lamp and cooking pot with sections.
(Cat. No. 175705, U. S. N. M. Inglefield Gulf. Collected by Henry G. Bryant, commander of Peary Relief Expedition.)

Fig. 2. Outline, section, and front view of large lamp.
(Cat. No. 126745, U. S. N. M. Smith Sound. Collected by Dr. Emil Bessels.)



LAMPS OF GREENLAND.

LAMP COMPLETE. With stool and pot (model). Made for Dr. I. I. Hayes. Eskimo, South Greenland. Collected by Dr I. I. Hayes. 176066. Plate 8, fig. 4.

DRYING FRAME. Rack hung over the fire in skin tent. It is made of six slats lashed to crossbars at the end. Length, 38½ inches; width, 19 inches. Eskimo, North Greenland. Collected by H. G. Bryant, commander of the Peary relief expedition. 169043. Plate 9, fig. 1.

ROUND COOKING POT. Small pot cut from soapstone. Holes are bored through the edge for suspension. This is probably one of the small objects found in graves in South Greenland. Diameter, 2⅝ inches; height, 1¼ inches. Eskimo, South Greenland. From the Royal Museum of Northern Antiquities, Copenhagen. 45848. Plate 9, fig. 2.

COOKING POT. Of soapstone; the walls thin and strongly bulged at the sides, the ends only slightly so. The sides slant outward in reverse of those of Ungava, Labrador. Length, 13⅜ inches; width, 8 inches; height, 4¾ inches. Itah Eskimo, Port Foulke, West Greenland. Collected by Dr. I. I. Hayes. 563. Plate 9, fig. 3.

COOKING POT. Oblong-oval pot cut from soapstone. At the four corners beckets have been cut out in the edge of the pot; these are pierced for passage of the suspending cords. This pot belongs with lamp No. 45846, plate 7, fig. 2. Length, 8½ inches; width, 6¼ inches; height, 3 inches. Eskimo, Greenland. From the Royal Museum of Northern Antiquities, Copenhagen. 45850. Plate 9, fig. 4.

COOKING POT. Boat-shaped pot cut out of soapstone with iron tools. There is a small, flat, elliptic area on the bottom upon which the pot rests. There are no holes on the edge for suspension, the interior of the vessel is rough, and though called a "cooking vessel" there is no evidence of such use. It is also of unusual shape and manifestly is not intended for use with the lamp. Probably the vessel is intended to set on an open fire. Length, 11¾ inches; width, 7 inches; height, 3¾ inches. Eskimo, Greenland. From the Royal Museum of Northern Antiquities, Copenhagen. 45851.

COOKING POT. Small oblong vessel cut from soapstone to represent the cooking pot. Buried with the dead. Length, 2⅛ inches; width 1 7/16 inches; height ⅜ inch. Eskimo, South Greenland. Collected by Governor Fencker. 63910.

THE LAMPS OF THE MACKENZIE RIVER.

The two lamps in the United States National Museum from the Mackenzie River were collected many years ago by Robert MacFarlane. They are small and have a divided bridge, relating them to the lamps of St. Lawrence Island and eastern Siberia. No information whatever is available relating to the use of the lamp by the Mackenzie River Eskimo.

WINTER TRAVELING LAMP. Of soapstone, crescentic in shape, bottom nearly flat, sides vertical. The reservoir is shallow and is divided into two portions by a bridge. The bridge is divided into two portions by a canal cut across the middle, and the wall of the reservoir is continued around the ends, forming a narrow canal at the end of the bridge. The wick edge is slightly curved, as is the rule in all Eskimo lamps. This small lamp, which is called "a winter traveling lamp," is useful only for giving a temporary light, and was probably carried in the interest of the smokers. Length, 5 inches; width, 2½ inches; height at front, ⅛ inch; at back, ¾ inch. Eskimo, Mackenzie River, Canada. Collected by R. MacFarlane. 2071. Plate 10, fig. 1.

SMALL LAMP. Of clay slate carved with a knife; semilunar in shape; bottom flat, edges rounded. The reservoir is plain, slanting slightly from the wick edge to the rear wall. This is a model of a "winter traveling lamp" used on a journey

carried on the person by travelers. Small as the lamp is it seems to show traces which indicate that it has been burned. Length, 3½ inches; width, 1⅝ inches. Eskimo, Mackenzie River, Canada. Collected by R. MacFarlane. 1109. Plate 10, fig. 2.

THE LAMPS OF POINT BARROW.

The lamps from Point Barrow in the United States National Museum have been ably described by Mr. John Murdoch[1] in his paper on the "Ray Collection." It is only necessary, therefore, to point out the relation of the Point Barrow type lamp to those of Smith Sound. The cooking pot is also like that of the same locality in Greenland.

No drying frames were procured from Point Barrow or are mentioned in Mr. Murdoch's paper. It is quite likely that the drying frame exists at Point Barrow. In fact, Captain Herendeen assures the writer that they are used there.

There is a lamp of pottery in the Nathan Joseph collection, Golden Gate Park Museum, San Francisco, from Alaska, which from its form appertains to Point Barrow, where pottery was formerly made.

LAMP. This lamp is elliptic in outline and is very well worked from soapstone. The reservoir is deep, and at the rear is a semilunar terrace standing three-fourths inch above the floor with slanting side. The rear wall of the reservoir is nearly vertical, while the wick side slopes down to the floor of the lamp. The bottom of the lamp is flat and the sides incline inward. The wick line has a curve of about 2 feet radius. The lamp has been broken and mended with sinew and cement. The resemblance of this lamp to those of Greenland (Bessels) is striking. The terrace may, however, correspond to the cavity in a similar position in the Cumberland Gulf lamp (see Plate 11, fig. 2) and for a similar use, the placing of unmelted blubber. Length, 17 inches; width, 8 inches; height, 2¼ inches. Eskimo, Point Barrow, Alaska. Collected by Lieut. P. H. Ray, U. S. A. 89879. Plate 11, fig. 1.

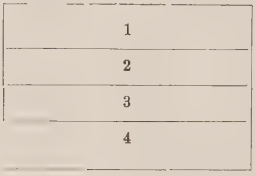
LAMP. Large semilunar lamp of siliceous sandstone. It is roughly worked out, but is quite a feat to do so well with this material. The cavity is rather deep, and its floor is high at the back and slopes to the middle line, where it meets the slope from the wick edge. The latter is straight. The bottom and corners rounded. The lamp slopes toward the wick edge, as the section shows. Length, 12½ inches; width, 8 inches; height in front, 2⅝ inches; at back, 3 inches. Eskimo, Point Barrow, Alaska. Collected by Lieut. P. H. Ray, U. S. A. 89880.

LAMP. Shallow, rude semilunar lamp of siliceous rock of small size. It was probably worked from a slab of stone, and must be tipped forward when in use. The reservoir is shallow and bowed—that is, formed by two slanting planes which meet at a middle line corresponding to the terrace in the rear of the type lamp. This lamp is a rude approximation to the better formed lamps of soapstone. It has, however, seen service. Length, 8¼ inches; width, 4⅛ inches; height, 1⅝ inches. Eskimo, Point Barrow, Alaska. Collected by Lieut. P. H. Ray, U. S. A. 89881.

TRAVELING LAMP. Small lamp of soapstone of somewhat irregular semilunar outline, owing to the shape of the original piece of stone. The reservoir is shallow and flat, the wick edge slanting down to the bottom. The wick edge is convex in outline. The lamp must be tipped forward to supply oil to the wick. This is one of the small lamps for special use. Length, 8⅛ inches; width, 4¼ inches; height, 1 inch. Eskimo, Point Barrow, Alaska. Collected by Lieut. P. H. Ray, U. S. A. 56673. Plate 11, fig. 2.

[1] Report of the Bureau of Ethnology, IX, pp. 105–109.

EXPLANATION OF PLATE 7



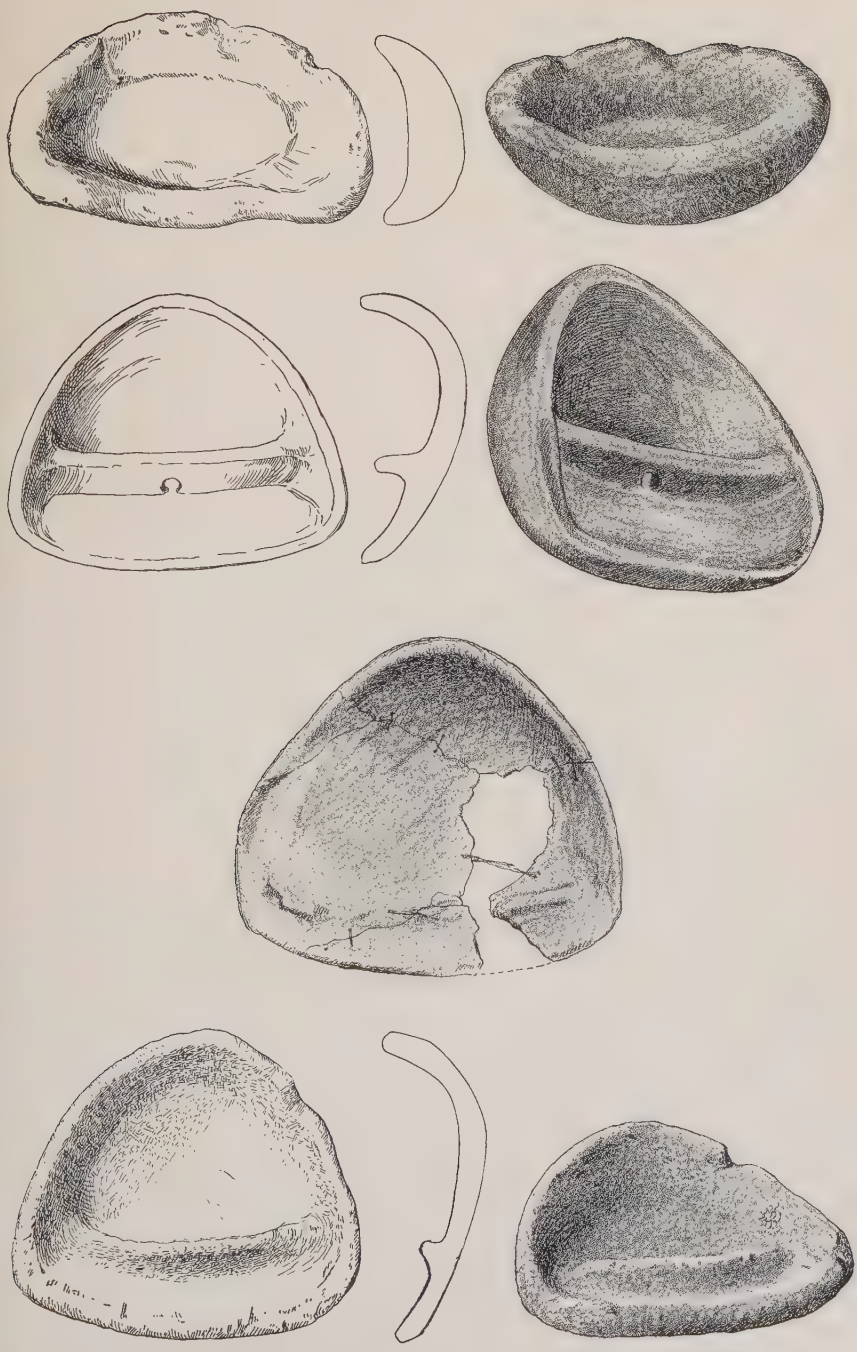
LAMPS OF GREENLAND.

Fig. 1. Outline, section, and front view.
(Cat. No. 504, U.S.N.M. Greenland. Collected by Dr. I. I. Hayes.)

Fig. 2. Same of lamp with bridge.
(Cat. No. 45846, U.S.N.M. Greenland. Royal Museum, Copenhagen.)

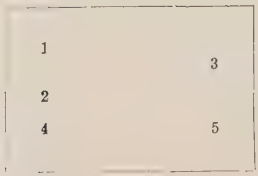
Fig. 3. Lamp with bridge found by Gen. A. W. Greely at Cape Baird. From Report of International Polar Meteorological Observations.

Fig. 4. Lamp with bridge.
(Cat. No. 45847, U.S.N.M. Greenland. Royal Museum, Copenhagen.)



LAMPS OF GREENLAND.

EXPLANATION OF PLATE 8.



LAMPS OF GREENLAND.

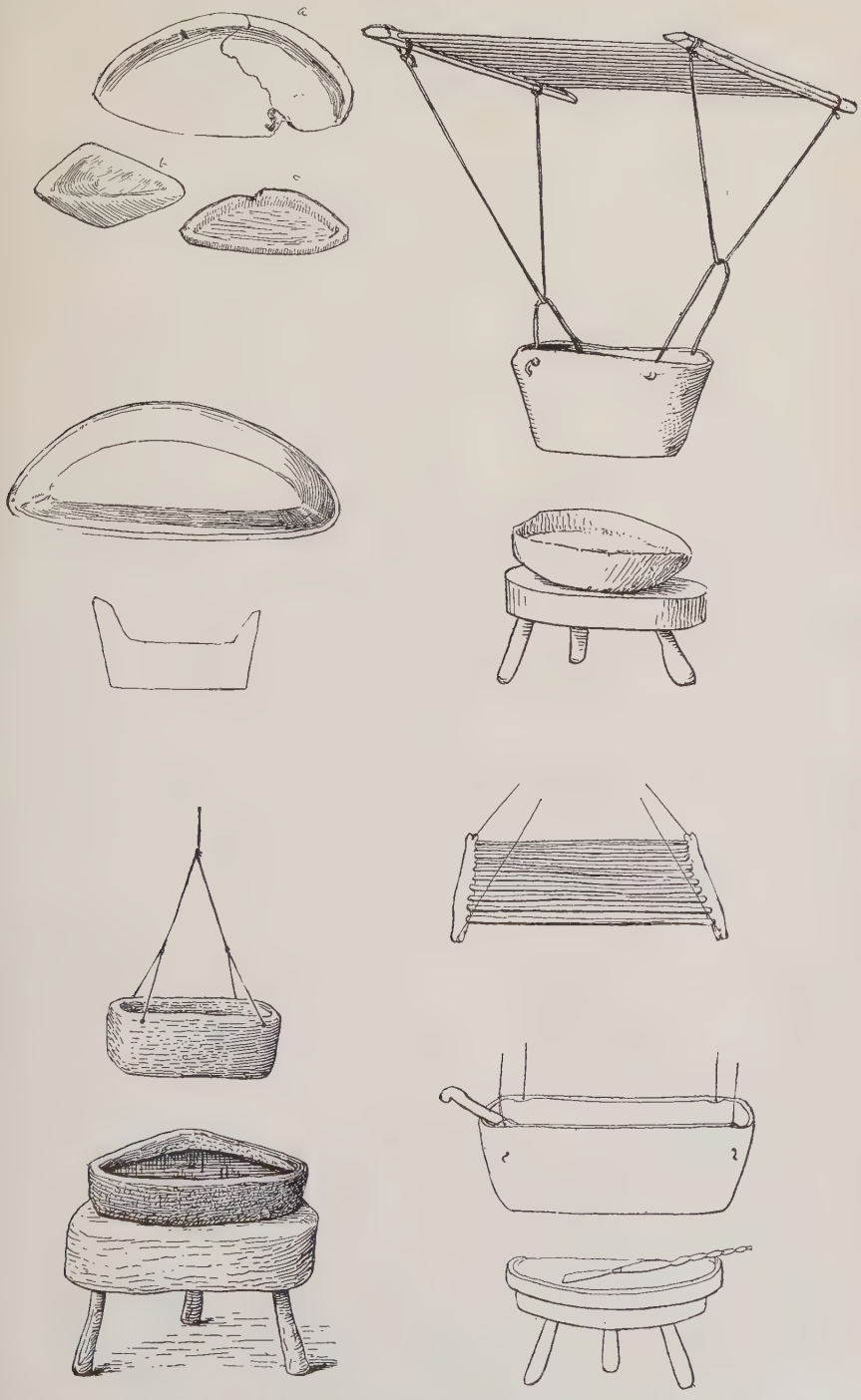
Fig. 1. Small mortuary lamps.
(Cape Bismarck, East Greenland.)

Fig. 2. Outline and section.
(Cat. No. 176065, U.S.N.M. South Greenland. Collected by Dr. I. I. Hayes.)

Fig. 3. Drying frame, cooking pot, lamp, and stool.
(Cat. Nos. 168941–3, U.S.N.M. East Greenland. Collected by Capt. Gustav Holm.)

Fig. 4. Cooking pot, lamp, and stool (model). South Greenland.
(Cats. No. 176066, U.S.N.M. Collected by Dr. I. I. Hayes.)

Fig. 5. Drying frame, cooking pot, and spoon, lamp, lamp trimmer, and stool. East Greenland.
(After Holm and V. Garde.)



LAMPS OF GREENLAND.

EXPLANATION OF PLATE 9.

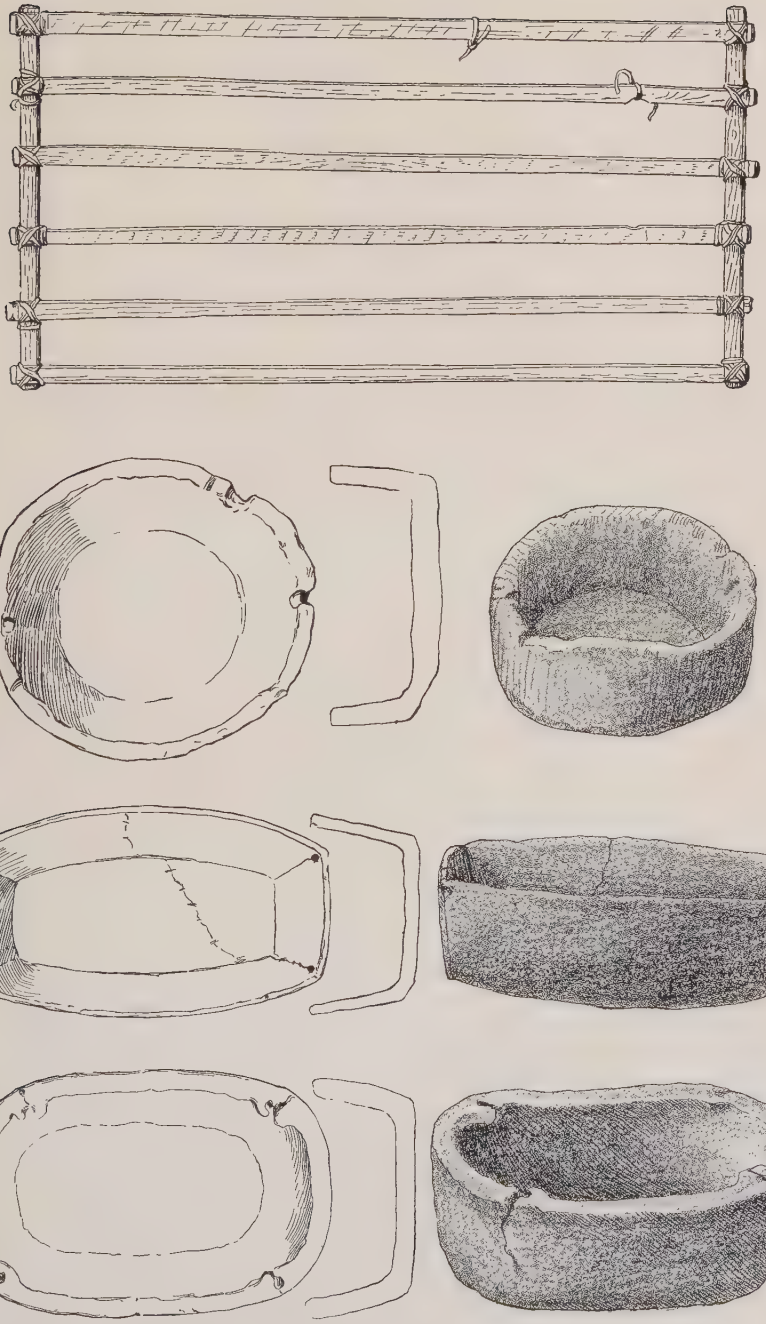
DRYING FRAME AND COOKING POTS OF GREENLAND.

Fig. 1. Drying frame for tent.
(Cat. No. 169043, U.S.N.M. North Greenland. Collected by Henry G. Bryant, Peary Relief Expedition.)

Fig. 2. Round cooking pot.
(Cat. No. 45848, U.S.N.M. South Greenland. Royal Museum, Copenhagen.)

Fig. 3. Outline, section, and side view of cooking pot.
(Cat. No. 563, Port Foulke, West Greenland. Collected by Dr. I. I. Hayes.)

Fig. 4. Cooking pot.
(Cat. No. 45850, U.S.N.M. Greenland. Royal Museum, Copenhagen.)



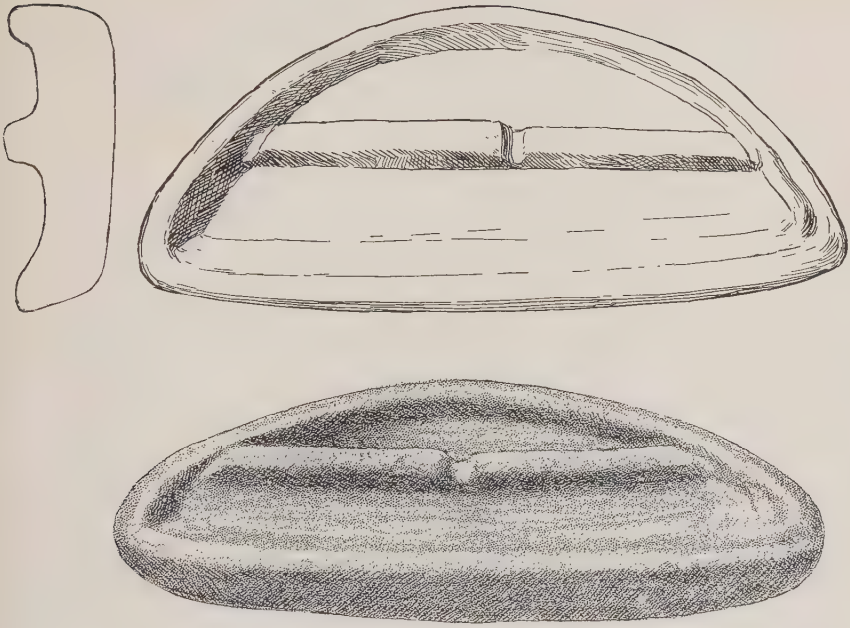
DRYING FRAME AND COOKING POTS OF GREENLAND.

EXPLANATION OF PLATE 10.

LAMPS OF THE MACKENZIE RIVER.

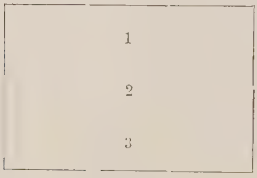
Fig. 1. Section, outline, and front view of small lamp with bifid bridge.
(Cat. No. 2071, U.S.N.M. Mackenzie River, Canada. Collected by R. MacFarlane.)

Fig. 2. Outline, section, and front view of small lamp.
(Cat. No. 1109, U.S.N.M. Mackenzie River, Canada. Collected by R. MacFarlane.)



LAMPS OF THE MACKENZIE RIVER.

EXPLANATION OF PLATE 11.

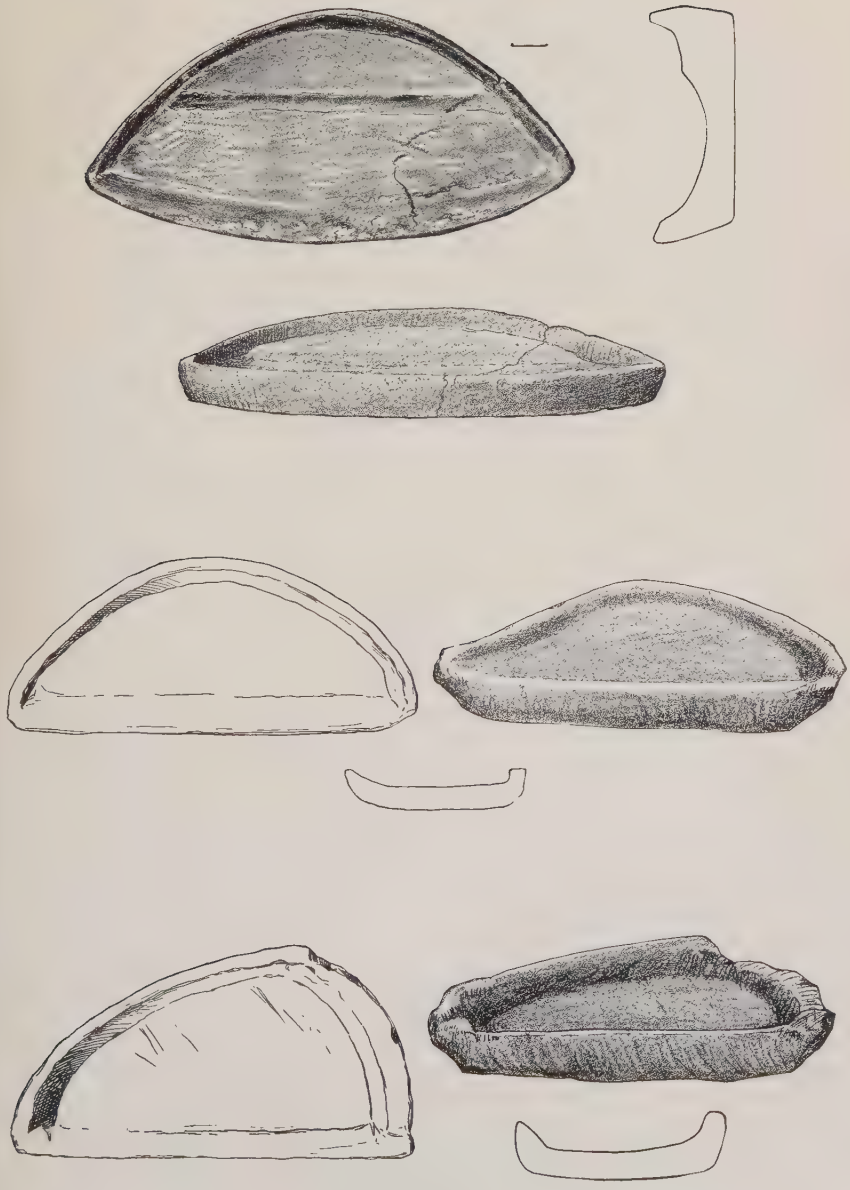


LAMPS OF POINT BARROW.

Fig. 1. Soapstone lamp.
(Cat. No. 89879, U.S.N.M. Collected by Lieut. P. H. Ray, U. S. A.)

Fig. 2. Soapstone lamp.
(Cat. No. 56673, U.S.N.M. Collected by Lieut. P. H. Ray, U. S. A.)

Fig. 3. Soapstone lamp, rude.
(Cat. No. 89882, U.S.N.M. Collected by Lieut. P. H. Ray, U. S. A.)



LAMPS OF POINT BARROW.

LAMP. Rude lamp of soapstone, which owes its irregular shape to the original piece of stone from which it was excavated. Length, 6¼ inches; width, 3½ inches; height, 1⅜ inches. Eskimo, Point Barrow, Alaska. Collected by Lieut. P. H. Ray, U. S. A. 89882. Plate 11, fig. 3.

THE LAMPS OF KOTZEBUE SOUND.

The description of the lamps from Kotzebue Sound must be based upon two small specimens in the United States National Museum. These lamps have the shape of a clam shell, having the length and width nearly equal, exactly so in one specimen. A lamp from the Nathan Joseph collection in the Golden Gate Park Museum in San Francisco is of this type, and is undoubtedly from the Kotzebue region. (See plate 12, fig. 3.) The length is 10¾ inches and the width, 9¼ inches. The material is clay slate.[1] One of the lamps in the Field Columbian Museum is made of wood.[2]

TRAVELING LAMP. Of soapstone; ovate triangular in outline, all corners being rounded for comfort in carrying. Bottom and floor of reservoir flat. Lamp does not incline. Walls of side slanting to reservoir floor. Wick edge bowed more than usual. Length, 6¾ inches; width, 5 inches; height, 1⅝ inches. Hotham Inlet, Kotzebue Sound, Alaska. Collected by E. W. Nelson. 64223. Plate 12, fig. 1.

LAMP. Small model in soapstone of the typical semilunar shape of the Eskimo lamp from Greenland to Norton Bay. Length, 1⅜ inches; width, 2⅛ inches; height, ½ inch. Eskimo, Cape Darby, Norton Bay, Alaska. Collected by E. W. Nelson. 48138. Plate 12, fig. 2.

THE LAMPS OF NORTON SOUND.

The lamps from the northern shore of Norton Sound are of the Kotzebue type, flat and with the outline of the clam shell.

The lamp from St. Michaels on the south shore seems to anticipate the sadiron lamp of the Alaskan Peninsula. It must be borne in mind that St. Michaels is the great emporium of this region, and specimens drift in there from many different localities.

LAMP. Shallow lamp of sandstone of the shape of the small lamp 44338, well made and evidently having seen long service. The wick edge is nearly straight; the corners rounded by use. This lamp is the Kotzebue type, which is extremely simple. Length of wick edge, 8 inches; width, 6½ inches; heighth, 1⅞ inches. Eskimo, Norton Sound, Alaska. Collected by E. W. Nelson. 49110. Plate 13, fig. 1.

SMALL LAMP. Small semilunar lamp, excavated from soapstone, with slanting walls and slightly curved bottom. The lamp is very shallow and the wick edge straight. It was probably used by hunters or travelers in the summer. Length, 3¼ inches; width, 4⅞ inches; height, ¾ inch. Eskimo, Norton Sound, Alaska. Collected by E. W. Nelson. 44338. Plate 13, fig. 2.

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[1] Outlines and sections of all the lamps in the San Francisco Museum were furnished through the kindness of the curator, Charles P. Wilcomb.

[2] Several Kotzebue lamps are in the Field Columbian Museum at Chicago. One of these, a small oval lamp with divided bridge is interesting in relation to the distribution of this feature. Through the kindness of Dr. George A. Dorsey a photograph of these lamps was secured which unfortunately came too late for insertion in this work.

STONE LAMP. Worked from tufaceous rock; very much disintegrated. Shape that of a sadiron; bottom flat, rounding toward vertical sides. The reservoir is oval and shallow; the sides rise to uniform height all around it. The point where the wick has been laid is not specially worked for the purpose. This lamp bears no resemblance to those collected by E. W. Nelson in Norton Sound. In general appearance it more nearly resembles some varieties of the Kodiak lamp, and the narrow lip increases the resemblance. There are two lamps in the United States National Museum from the peninsula lying between Norton and Kotzebue sounds for comparison, which show that its affiliations are with those of Kodiak and the Alaskan Peninsula. Length, 11⅝ inches; greatest width, 6½ inches; height, 2 inches. Eskimo, St. Michaels, Norton Sound, Alaska. Collected by L. M. Turner. 30761. Plate 13, fig. 3.

SMALL LAMP. Formed of concretion of gray, shaly rock, of natural shape, not worked in any way. It is oval in shape and on one side there is evidence of the charring of the wick. This lamp was probably carried by hunters. Length, 3¾ inches; width, 2½ inches; height, ¾ inch. Eskimo, St. Michaels, Norton Sound, Alaska. Collected by E. W. Nelson. 43470. Plate 13, fig. 4.

THE LAMPS OF ST. LAWRENCE ISLAND.

These lamps are of pottery, skillfully made and baked. The lamps with two wick edges are unique, and altogether the utensil in this locality and has assumed several curious forms. The bridged lamp of North Greenland is here repeated, but with various modifications, and are connected with Asia by the Siberian example. (See plate 17.)

The pottery lamp rests and drip catchers are unique. One of the rests in the collection is a whale's vertebra, with the spinous processes hacked off.

The drying frame does not exist. Its place is taken by pegs driv in the earth walls of the house.

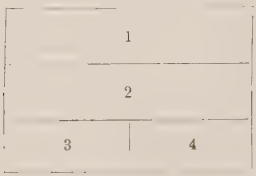
The shape of the St. Lawrence Island lamp seems to have followed that of the wooden platters.

EARTHENWARE LAMP. Made of clay, mixed with angular rock fragments, stro and well burnt. In shape it is the most divergent lamp in the collecti Viewed from above its outline is oblate, having a square projection from o side separated from the main reservoir by a low ridge. This lamp inclin slightly toward the wick edge. The wick edge curves gently, while in front it is a low bridge with ends slanting down to the floor of the lamp, allowing narrow space for the oil to flow around to the wick. The purpose of the rear projection and cavity is conjectural. It would seem very convenient for grasping the lighted lamp if it were desired to carry it. This lamp could be carried lighted, as the bridge would prevent the wash of the oil against the wick. This may be one of the functions of the bridge. This lamp is supplied with a wooden dish in which it rests. Width, 5⅜ inches; length, 6¼ inches; height at rear, 1⅞ inches; at front, 1⅜ inches. Eskimo, St. Lawrence Island, Alaska. Collected by E. W. Nelson. 63543. Plate 14, figs. 1, 2, and 3.

LAMP. Pottery lamp, oblong, with rounded corners. Slanting bridges on either side springing from angle formed by side and floor. These bridges are divided by a central cleft into two equal portions. Length, 11 inches; width, 9½ inches; height, 2½ inches. Eskimo, St. Lawrence Island, Alaska. Collected by E. W. Nelson. 63570. Plate 15, fig. 1.

LAMP. Made of coarse pottery, oblong in shape. This lamp has continuous bridges on either side; that is, not cleft or pierced, but open around their ends for the

EXPLANATION OF PLATE 12.



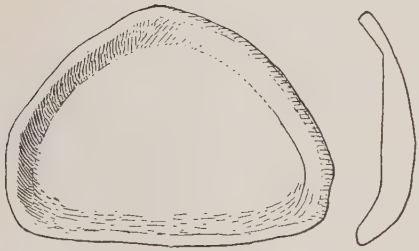
LAMPS OF KOTZEBUE SOUND.

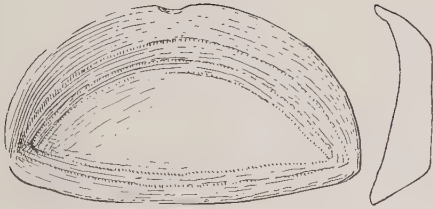
Fig. 1. Traveling lamp. Soapstone.
(Cat. No. 64223, U.S.N.M. Collected by E. W. Nelson.)

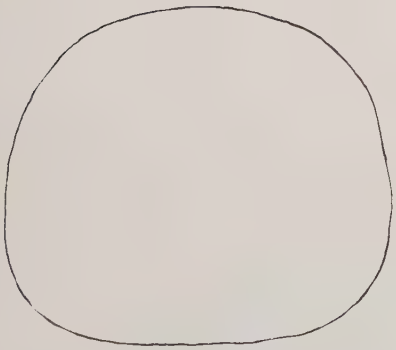
Fig. 2. Small toy lamp. Although this lamp is from Cape Darby, it is nearer to the Kotzebue type than to that of Norton Sound.

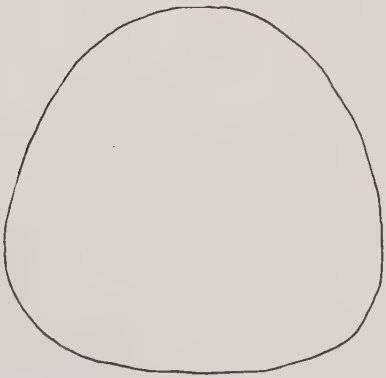
Fig. 3. Outline of Kotzebue lamp in the Golden Gate Park Museum, San Francisco, California.

Fig. 4. Outline of Kotzebue lamp.
(Cat. No. 75508, U.S.N.M. Collected by Lieut. Geo. M. Stoney, U.S.N.)



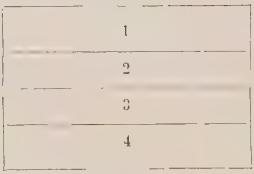






LAMPS OF KOTZEBUE SOUND.

EXPLANATION OF PLATE 13.



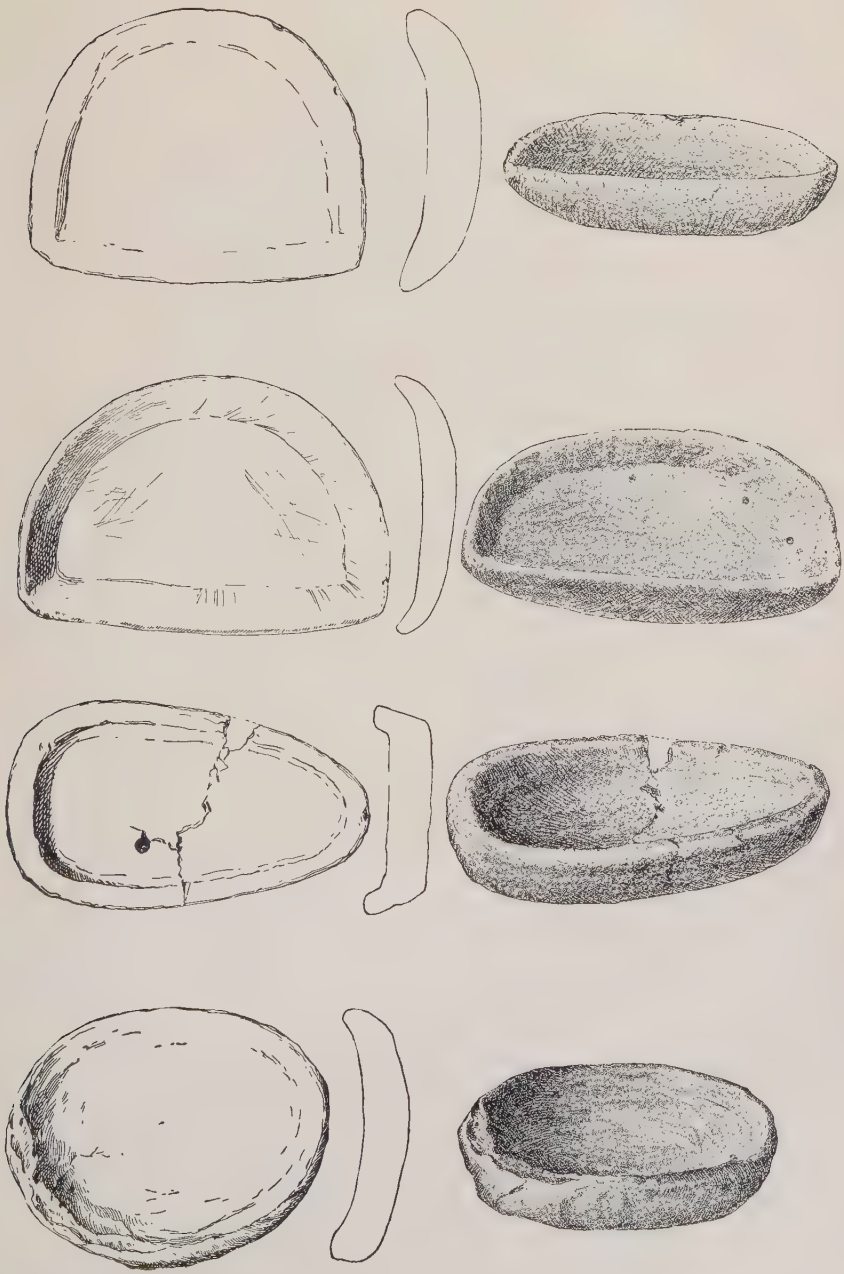
LAMPS OF NORTON SOUND.

Fig. 1. Sandstone lamp.
(Cat. No. 49110, U.S.N.M. Norton Bay. Collected by E. W. Nelson.)

Fig. 2. Small lamp.
(Cat. No. 44338, U.S.N.M. Norton Sound. Collected by E. W. Nelson.)

Fig. 3. Sandstone lamp.
(Cat. No. 30761, U.S.N.M. St. Michaels, Norton Sound. Collected by L. M. Turner.)

Fig. 4. Lamp of concretion.
(Cat. No. 43470, U.S.N.M. St. Michaels, Norton Sound. Collected by E. W. Nelson.)



LAMPS OF NORTON SOUND.

flow of the oil. Length, 13½ inches; width, 10¼ inches; height, 3 inches. Eskimo, St. Lawrence Island, Alaska. Collected by E. W. Nelson. 63569. Plate 15, fig. 2.

DOUBLE LAMP. Made of clay with large admixture of quartz fragments, strongly burnt and completely soaked with oil. In shape it is a large oblong platter having concave side with a step at either end above the bottom of the reservoir. At either side the step is raised into crescentic ridges, each pierced with two holes slanting down to the reservoir with the angle of the sides. Through these orifices the wick is fed. The wick is laid along the edge of either side of the lamp. This is the only example of a double Eskimo lamp, and from its capacity it must have been used where oil was plenty. The lamp bears a likeness to the wooden dishes of this region. Length, 15½ inches; width, 12¼ inches; height, 2⅝ inches Eskimo, St. Lawrence Island, Bering Strait, Alaska. Collected by E. W. Nelson. 49196. Plate 15, fig. 3.

LAMP. This lamp is made of clay burning yellow, with coarse temper of subangular quartz fragments. It is oblong, with truncated corners resembling in shape the wooden dishes of the Norton Sound region, and is rather deep. The clay was probably formed in a wooden dish. The upper edge is flat, except on the side where the wick is placed, which is rounded off. At 2 inches from the lip and parallel with it there is a bridge 4¼ inches long, standing 1⅜ inches above the bottom of the lamp at the rear and five-eighths of an inch in relief in front of the lip, thus forming a shelf. The office of the bridge may be to prevent particles of moss falling into the oil, to prevent floating masses of unmelted blubber from interfering with the wick, or it may be used as a secondary wick surface when the oil is low. The deposits on the ridge seems to point to the latter use. By the flattening of the base the lamp leans forward toward the wick edge at a low angle, as is observed in the Chukchis lamp (Plate 17, fig. 1) and in common with the latter it possesses a ridge. This lamp is set on a vessel which combines the functions of rest and drip catcher. Length, 8¼ inches; width, 6¾ inches; height, at rear, 2⅛ inches; at front, 2 inches. Eskimo, St. Lawrence Island, Alaska. Collected by E. W. Nelson. 63544. Plate 15, fig. 4.

OBLONG COOKING POT. Made of coarse earthenware. At the upper corners the clay has been pinched up and pierced for the attachment of cords for suspending the pot. The vessel is rudely made and is much blackened with lamp smoke. Length, 6 inches; width, 4⅞ inches; height, 2¼ inches. Eskimo, St. Lawrence Island, Alaska. Collected by E. W. Nelson. 63546. Plate 16, fig. 1.

OBLONG COOKING POT. Small oblong pot of coarse pottery, blackened and covered on the bottom with deposit from the lamp. Each corner is pierced with two orifices through which pass whalebone strips for suspending the pot. The vessel would seem too small for cooking food, but it has evidently been used over the lamp. Length, 4⅜ inches; width, 3⅛ inches; height, 1⅞ inches. Eskimo, St. Lawrence Island, Alaska. Collected by E. W. Nelson. 63548. Plate 16, fig. 2.

OBLONG COOKING POT. Small oblong pot of very coarse earthenware, without lugs; probably a food vessel, as it is not smoked by the lamp. Length, 4⅞ inches; width, 3⅞ inches; height, 1⅝ inches. Eskimo, St. Lawrence Island, Alaska. Collected by E. W. Nelson. 63547. Plate 16, fig. 3.

DRIP CATCHER. Long, narrow, shallow vessel of coarse burnt clay, rounded at the ends and slightly curved. This vessel is catalogued as a lamp. Its edges are not found for the wick, which is an infallible test for a lamp. It was probably placed under the lip of a lamp to catch dropping oil. Length, 8½ inches; width, 2⅞ inches; height 1⅜ inches. Eskimo, St. Lawrence Island, Alaska. Collected by E. W. Nelson. 63545. Plate 16, fig. 4.

THE LAMPS OF EASTERN SIBERIA.

A full account of the Chukchis lamps of eastern Siberia is given by Baron Nordenskiold in his "Voyage of the *Vega*." The method of installation is shown on plate 17, fig. 2, taken from that work.

The connection with Asia is one of a number which have been noticed recently.

LAMP. Excavated from soapstone, apparently with stone tools. The original surface of the stone shows in one place on the exterior. It is roughly hemispherical. When resting on the rounded and insecure base the rim of the lamp slants at an angle of about 37 degrees, the walls of the cavity being high at the rear, running down and merging into the wick edge. The floor rises from the middle toward the back and front. The bridge is divided into two equal sections by a V-shaped cut in the middle, the oil thus flowing to the wick through three channels. The wick edge is slightly curving and wider than the back of the lamp. Width, 6½ inches at wick edge; length to rear, 6 inches; height at rear, 4⅜ inches; front, 1½ inches. Chukchis, eastern Siberia. Collected by E. W. Nelson. 64222. Plate 17, fig. 1.

THE LAMPS OF BRISTOL BAY.

South of Norton Sound the lamp becomes a shallow saucer of baked clay, rarely of stone, without wick edge, so that in absence of knowledge of their use they never would be classed as lamps. As has been mentioned, they are affiliated with Asiatic saucer lamps.

The number of specimens in the United States National Museum from the north shore of Bristol Bay has given this type its name. Perhaps a more descriptive name would be lamp of the Yukon-Kuskokwim tundra.

These lamps are set up on a stake, having the top hollowed out to receive the bulging bottom of the lamp. The wick is laid along a small space on the edge, following the Kadiak method. It is not known whether this lamp is ever furnished with a single solid wick or burned with a floating wick. The former supposition seems to be borne out by the model from Nushagak (fig. 1).

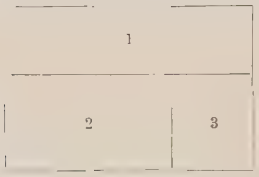
The cooking pot of this region is circular, and designed for placing on an open fire, as driftwood is plentiful.

In the southern portion of this region an admixture of forms takes place. The lamps are of stone, circular, but in nearly every case have the wick edge worked out. A similar mixture of form occurs between Kadiak, the Alaskan Peninsula, and Aleutian Chain. Four of these lamps are shown on plate 20.

LAMP. This is the smallest lamp among the series of pottery lamps in the United States National Museum. It apparently has been little used, probably for some special purpose or as a toy. Eskimo, Cape Vancouver, Alaska. Collected by J. H. Turner. 153703. Plate 18, fig. 1.

LAMP. Of pottery, similar in form to typical Bristol Bay lamps. Diameter 3⅝ inches; height, 1½ inches. Eskimo, Cape Vancouver, Alaska. Collected by J. H. Turner. 153702. Plate 18, fig. 2.

EXPLANATION OF PLATE 14.

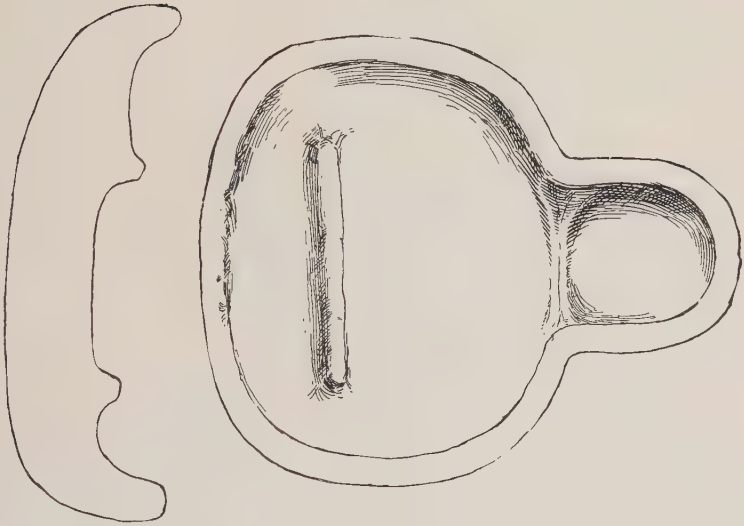


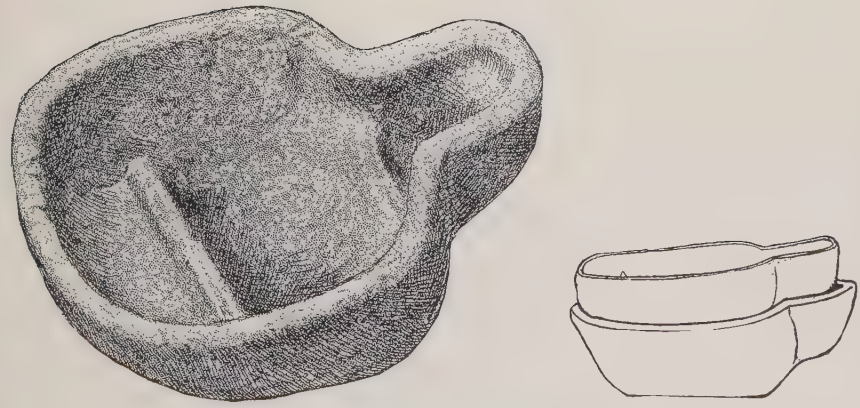
LAMPS OF ST. LAWRENCE ISLAND.

Fig. 1. Section and outline of pottery lamp.
(Cat. No. 63543, U.S.N.M. Collected by E. W. Nelson.)

Fig. 2. Side view of same.

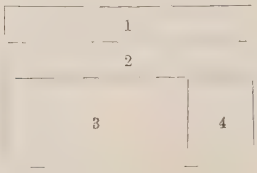
Fig. 3. Same lamp in wooden rest or dish carved out to accommodate the lamp. The rest is No. 1270181 of the Museum catalogue and was collected by E. W. Nelson.





LAMPS OF ST. LAWRENCE ISLAND.

EXPLANATION OF PLATE 15.



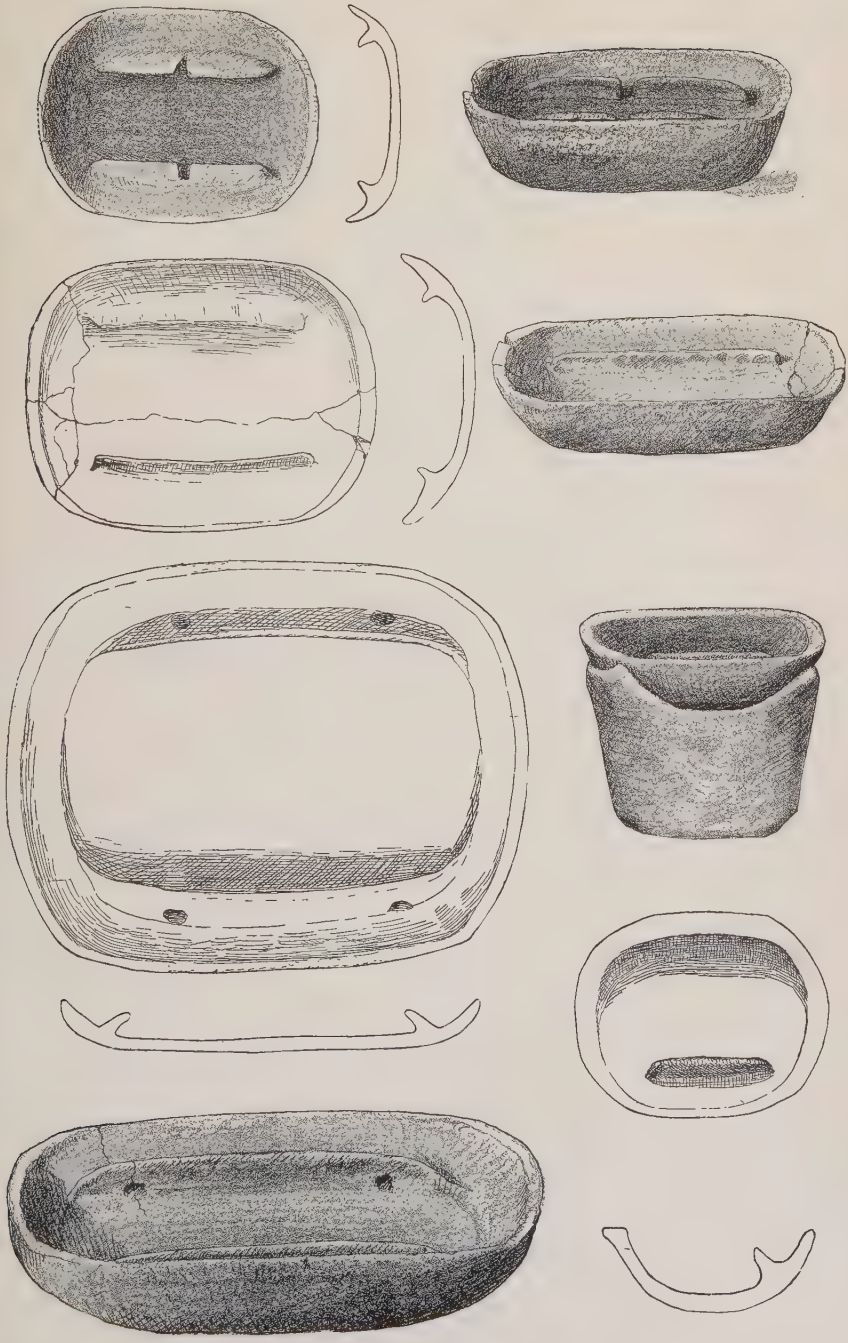
LAMPS OF ST. LAWRENCE ISLAND.

Fig. 1. Double earthenware lamp, with divided bridges.
(Cat. No. 63570, U.S.N.M. Collected by E. W. Nelson.)

Fig. 2. Double earthenware lamp, with continuous bridges.
(Cat. No. 63569, U.S.N.M. Collected by E. W. Nelson.)

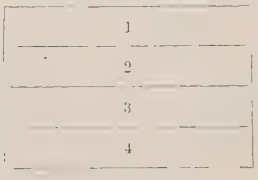
Fig. 3. Large double earthenware lamp, with pierced bridges.
(Cat. No. 49196, U.S.N.M. Collected by E. W. Nelson.)

Fig. 4. Balanced earthenware lamp, with single bridge. In the upper drawing t
lamp is shown set upon the pottery rest and drip catcher.
(Cat. No. 63544, U.S.N.M. Collected by E. W. Nelson.)



LAMPS OF ST. LAWRENCE ISLAND.

EXPLANATION OF PLATE 16.



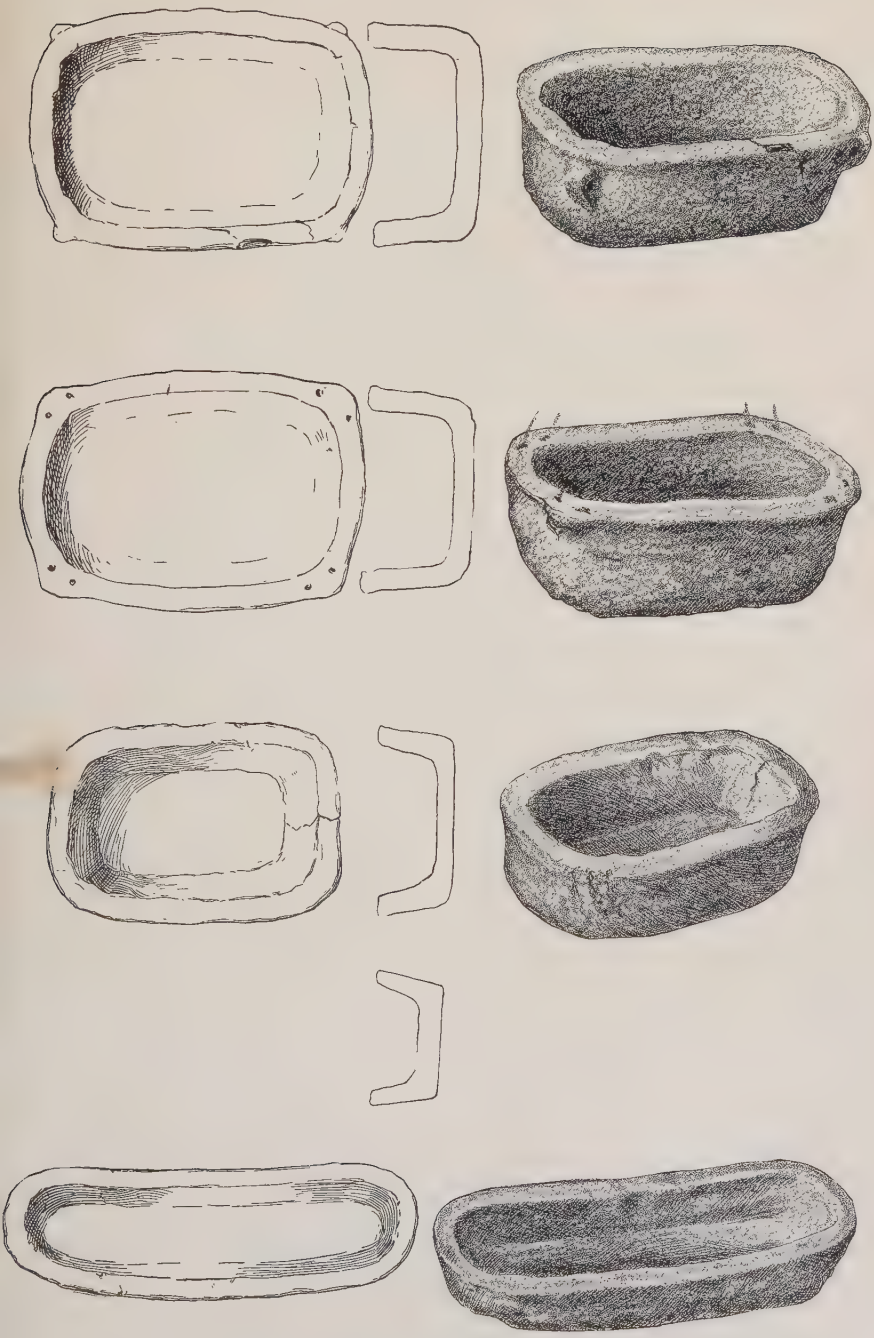
COOKING POTS OF ST. LAWRENCE ISLAND.

Fig. 1. Earthenware. St. Lawrence Island is the southern limit of cooking pots hung over the lamp. The jar-shaped cooking pots from Norton Sound and southward are set on a fire of driftwood.
(Cat. No. 63546, U.S.N.M. Collected by E. W. Nelson.)

Fig. 2. Earthenware.
(Cat. No. 63548, U.S.N.M. Collected by E. W. Nelson.)

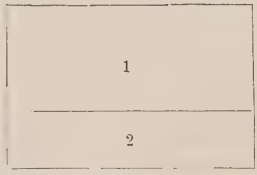
Fig. 3. Earthenware. Probably a food vessel.
(Cat. No. 63547, U.S.N.M. Collected by E. W. Nelson.)

Fig. 4. Earthenware. Probably a drip catcher.
(Cat. No. 63545, U.S.N.M. Collected by E. W. Nelson.)



COOKING POTS OF ST. LAWRENCE ISLAND.

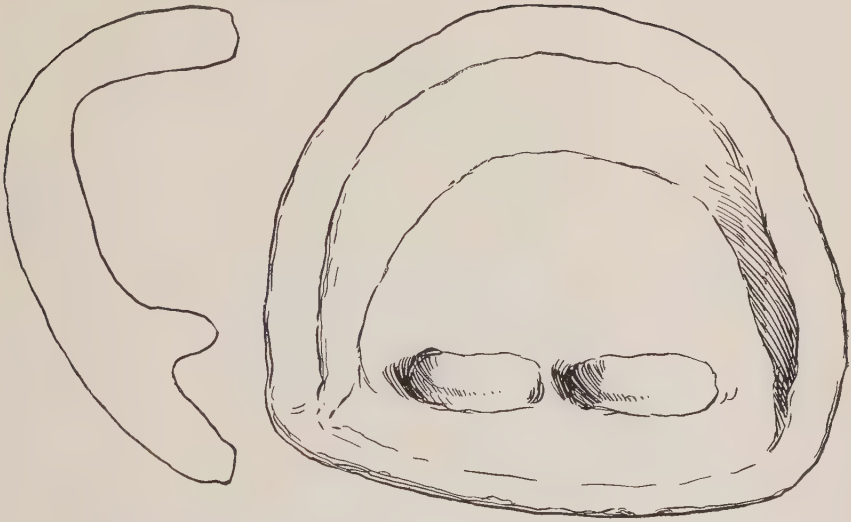
EXPLANATION OF PLATE 17.



LAMPS OF EASTERN SIBERIA.

Fig. 1. Outline, section, and front view of balanced soapstone lamp with bridge.
(Cat. No. 64222, U.S.N.M. Collected by E. W. Nelson.)

Fig. 2. Outline and section showing method of installation of Chukchis lamp. Fro
the "Voyage of the Vega."



LAMPS OF EASTERN SIBERIA.

LAMP. Old pottery lamp of the ordinary Bristol Bay type. The edge shows marks of charring and the lamp is soaked with oil. Diameter, 7½ inches; height, 2⅝ inches. Eskimo, Bristol Bay, Alaska. Collected by C. L. McKay. 56020a. Plate 18, fig. 3.

LAMP. Saucer-shaped lamp of pottery, soaked with oil. This lamp is plain. There is a very shallow depression on the interior just below the edge, which defines the rim. Diameter, 5¼ inches; height, 1⅜ inches. Eskimo, Ugashik, Bristol Bay, Alaska. Collected by J. W. Johnson. 127660b. Plate 18, fig. 4.

LAMP. Saucer shaped lamp of pottery, neatly made, soaked with oil. The walls are decorated with horizontal parallel shallow grooves scratched in the paste. The exterior of the beveled rim is decorated in the same way. In the center of the vessel is an outlined circle, from which radiate at right angles four arms, formed of grooves scratched in the paste, which Mr. Nelson informs the writer is a personal mark. Diameter, 4⅝ inches; height, 1½ inches. Eskimo, Big Lake, Alaska. Collected by E. W. Nelson. 38077. Plate 19, fig. 1.

LAMP. Of pottery, soaked with oil; saucer-shaped. In the bottom is a square cross in a circular field bounded by the lowest of the four grooves around the side. The outside of the rim has three grooves; the bottom is quite smooth and even in outline. Traces of moss are found in the grooves. The function of the grooves, if they are more than decorative, is not known. The lamp may have been burned by means of a piece of moss placed in the center or floating in the oil, like those of the Novaks.[1] Diameter, 3⅝ inches; height, 1½ inches. Eskimo of Lower Yukon, Alaska. Collected by E. W. Nelson, 38078. Plate 19, fig. 2.

LAMP. Pottery lamp with horizontal grooves around the inside of the walls and with beveled edge. The lamp is well-shaped and is shallower than 56022. It is incrusted with grease. Diameter, 8½ inches; height, 2⅝ inches. Eskimo, Bristol Bay, Alaska. Collected by C. L. McKay. 56021. Plate 19, fig. 3.

LAMP. Heavy, clumsily made, saucer-shaped, dish of unbaked clay without temper. The object has never been used. Diameter, 5 inches; height, 2 inches. Eskimo, Ugashik, Bristol Bay, Alaska. Collected by J. W. Johnson. 127660a.

LAMP. Evenly-shaped bowl lamp of pottery, with numerous horizontal ridges on the inside. Along a portion of the rim there is a charred crust, as though the lamp had been tilted and burned with a moss wick as in other lamps. The base is somewhat flattened. Diameter, 7 inches; height, 3¼ inches. Eskimo, Bristol Bay, Alaska. Collected by C. L. McKay. 56022.

LAMP. Made of fine homogeneous clay; burned. It is the largest circular pottery lamp in the United States National Museum. The edge is beveled and grooved. The grooves inside are shallow, and in the floor of the lamp is a circle with radiating arms, forming a cross. From the incrustation around the edge it would seem that a moss wick was used. Diameter, 10½ inches; height, 3¼ inches. Eskimo, Bristol Bay, Alaska. Collected by C. L. McKay. 56020.

LAMP. Heavy saucer-shaped lamp of pottery; soaked with oil from use. This lamp is plain, and has evidently seen long service. There is no well-marked wick edge, and it is probable that the wick floated in the oil or was placed in the center. This lamp was used in the house. Diameter, 8½ inches; height, 2⅝ inches. Eskimo, Ugashik, Bristol Bay, Alaska. Collected by J. W. Johnson. 127660c.

LAMP. This lamp is of hard crystalline rock. It has been worked apparently from a beach pebble by pecking. The lower portion is rounded without flattened portion for a base of support; the lamp, however, is stable and has a slight inclination toward the wick edge; around the side a wide groove has been worked, making a decided rim. The reservoir is shallow and perfectly oval in outline with a flat edge, which has been worked down at one apex of the oval to form a narrow lip for the wick. The reservoir and edge have been rubbed smooth. The lamp is

[1] Kennan, Tent Life in Siberia, p. 175.

a very fine specimen of stone working. It is like the Kadiak lamps in the lip, but the general appearance is that of the pottery lamps of the Bristol Bay region. Dimensions, 5½ inches by 4½ inches; height, 2¾ inches. Eskimo, Bristol Bay, Alaska. Collected by C. L. McKay. 56024. Plate 20, fig. 3.

THE LAMPS OF KADIAK.

There is a full series of lamps from Kadiak in the United States National Museum. They are of hard dioritic rock and are usually carefully worked and finished. It would be difficult to mention better specimens of stone working. Some of the lamps are very large, one in the collection weighing 67 pounds. They are oval in outline, with a shallow reservoir, low walls with flat top, the sides are often grooved, the bottom convex. The wick edge is a small groove cut through the wall at the apex of the oval leading to it.

There is no information concerning the installation of these lamps, the specimens, like those of the Aleuts, having been taken from old village sites.

An oval lamp of the type exists in the collection of the Alaska Commercial Company, Golden Gate Park Museum at San Francisco, California. It is curious, having the channel for the wick deeper than the bottom of the lamp and two conical projections rising from the floor of the reservoir near the back of the lamp. The material is diorite.

LAMP. Cut out of greenish diorite; upper surface polished; bottom showing hammer marks. The lamp is of sad-iron shape, the shallow reservoir surrounded by a broad flat rim. The edge of the lamp below the rim has been rubbed into a groove. The bottom is rounded, but the lamp is stable on its base. The wick lip is narrow. Length from front to back, 11½ inches; width, 8 inches; height 4 inches. Eskimo, Kadiak Island, Alaska. Collected by Commander L. A. Beardslee, U. S. N. 42321. Plate 21, fig. 1.

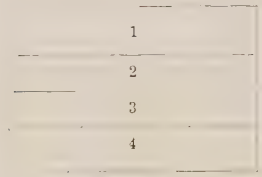
LAMP. Of hard, gray rock, originally perhaps a beach bowlder; bottom rounded, edge flat, cavity well worked out. A small lip has been cut into the edge at the apex of the oval, where there is an accumulation of charred wick. The cavity of the lamp has been employed for grinding red paint. Measurements, 6 by 8 by 3¼ inches. Eskimo, Karluk, Kadiak Island, Alaska. Collected by W. J. Fisher. 74724. Plate 21, fig. 2.

LAMP. This lamp is of metamorphic or volcanic rock. It is oval in outline, the sides straight and the bottom curved. The reservoir is neatly hollowed out and polished; the wick space or lip a shallow trough cut through the edge at the apex of the oval. When placed on its base, the lamp inclines strongly toward the lip. Length, 4½ inches; width, 3½ inches; height in front, 1½ inches; at rear, 2½ inches. Eskimo, Kadiak Island, Alaska. Collected by Dr. Tarleton H. Bean. 131237. Plate 21, fig. 3.

LAMP. Small oval lamp of hard rock (basalt), with rounded sides and flat bottom, the latter showing the fractured surface. The cavity is elliptic; the lip is worked at one end and shows traces of charred moss. This lamp was taken from an ancient dwelling and is probably a convenient pocket lamp used in traveling. Length, 3 inches; width, 2¼ inches; height, 1 inch. Eskimo, St. Paul, Kadiak Island, Alaska. Collected by W. J. Fisher. 90483. Plate 21, fig. 4.

LAMP. Lamp of greenish-gray rock, finely worked and polished. It is oval in shape, broader at the back than at the front, with almost flat, slightly rounded bottom, upon which it firmly rests. The reservoir shallow, the upper edge wide and flat. The lip is worked in the edge at the apex of the oval, slanting down

EXPLANATION OF PLATE 18.



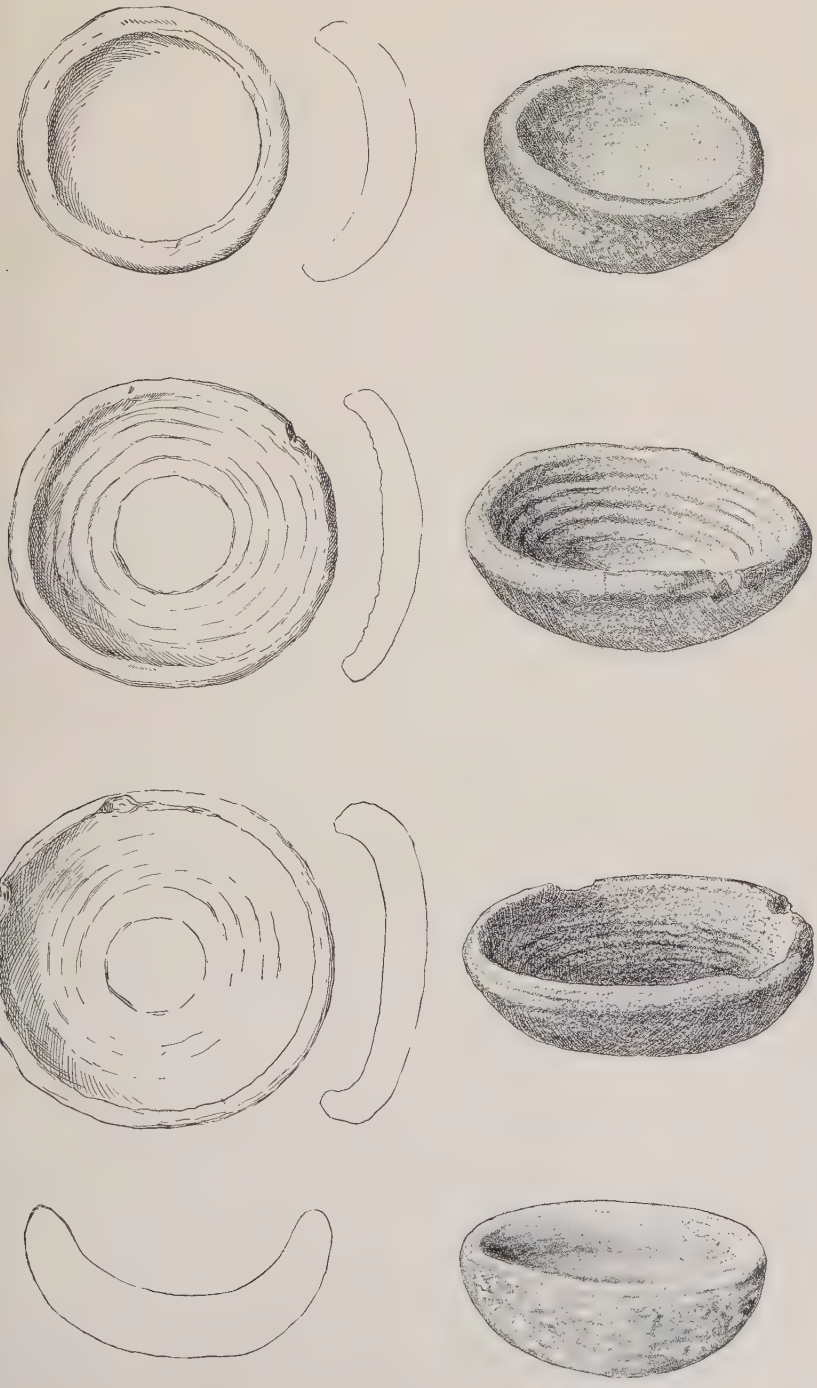
LAMPS OF BRISTOL BAY.

Fig. 1. Earthenware lamp.
(Cat. No. 153703, U.S.N.M. Cape Vancouver. Collected by J. H. Turner.)

Fig. 2. Earthenware lamp.
(Cat. No. 153702, U.S.N.M. Cape Vancouver. Collected by J. H. Turner.)

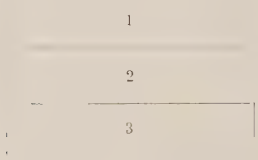
Fig. 3. Earthenware lamp.
(Cat. No. 56020*a*, U.S.N.M. Bristol Bay. Collected by C. L. McKay.)

Fig. 4. Earthenware lamp.
(Cat. No. 127630*b*, U.S.N.M. Ugashik, Bristol Bay. Collected by J. W. Johnson.)



LAMPS OF BRISTOL BAY.

EXPLANATION OF PLATE 19.

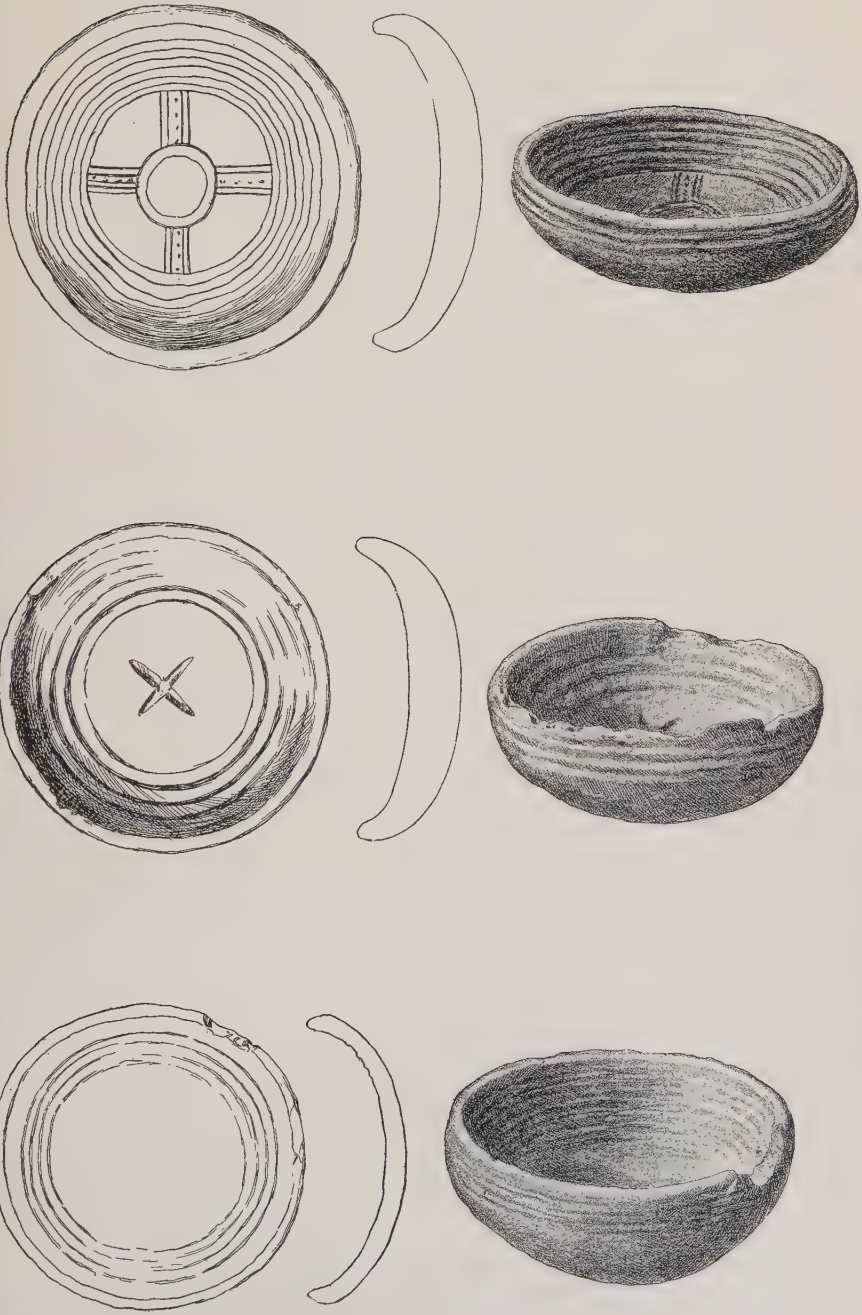


LAMPS OF BRISTOL BAY.

Fig. 1. Earthenware lamp with personal mark.
(Cat. No. 38077, U.S.N.M. Big Lake. Collected by E. W. Nelson.)

Fig. 2. Earthenware lamp with personal mark.
(Cat. No. 38078, U.S.N.M. Lower Yukon. Collected by E. W. Nelson.)

Fig. 3. Earthenware lamp.
(Cat. No. 56021 U.S.N.M. Bristol Bay. Collected by E. W. Nelson.)



LAMPS OF BRISTOL BAY.

into the reservoir, and a small portion of the flat edge is left whereon to place the moss. The side, edge, and reservoir are polished. Length, 8¼ inches; width, 7¼ inches; height, 2¼ inches. Eskimo, Katmai, Shelikoff Strait, Alaskan Peninsula. Collected by W. J. Fisher. 90476. Plate 21, fig. 5.

LAMP. Very finely worked from green metamorphic stone; ovate in outline, with squared edges and rounded bottom, on which the lamp accurately balances. Reservoir deep, uniformly concave; upper edge flat; lip narrow, cut in the edge at the point of the oval. The edges and reservoir have been polished; the bottom shows marks of hammer stone in working the lamp out. This is a splendid specimen of stone working. The lamp approximates the round shape of the Yukon Delta lamps. Length, 11 inches; width, 10 inches; height, 4 inches. Eskimo of Afognak Island, Alaska. Collected by W. J. Fisher. 74726.

LAMP. Oval lamp of fine-grained hard stone, nicely worked out. The lamp is a true oval, with a wick area at the smaller apex. The side of the lamp is worked with a broad, shallow groove, and the bottom is rounded. Length, 6¼ inches; width, 4⅜ inches; height, 1⅝ inches. Eskimo, Ugashik, Alaskan Peninsula, Alaska. Collected by W. J. Fisher. 90472.

LAMP. Of hard, gray rock from the beach; original surface showing on portions of the lower side. Sad-iron shape; upper edge slightly concave; reservoir shallow; lip narrow. The bottom is rounded; the sides plain, nearly vertical. The lamp sits nearly horizontal—that is, the rear only ¼ inch higher than the point. Length, 9¾ inches; width, 7½ inches; height, 2¾ inches. Eskimo, Afognak Island (Kadiak Group), Alaska. Collected by W. J. Fisher. 90473.

LAMP. Worked from a beach pebble of greenish-gray volcanic rock, of which the original surface shows in two places beneath. The cavity is shallow, uniformly concave, and is ovate in outline. There is no lip specially worked out for the wick, though the lamp inclines toward the apex of the oval. It resembles the Bristol Bay type. Length, 6 inches; width, 5½ inches; height, 2⅞ inches. Eskimo, Lesnova, Kadiak Island, Alaska. Collected by W. J. Fisher. 90481. Plate 20, fig. 1.

THE LAMPS OF THE ALEUTIAN ISLANDS.

The most primitive lamps on earth are those of the ancient Aleuts. Many of them are merely unmodified rock fragments, and by far the larger number which have been adapted show little modification. Very rarely a completely worked lamp is found. These lamps were, with few exceptions, collected by Mr. W. H. Dall from prehistoric village sites.

There is quite a number of small lamps in the collection from these islands. Mr. Dall informs the writer that the Aleuts used small lamps to take to sea in the fishing boats. As the men get chilled on these trips, the little lamps are useful to warm the hands or body. In the latter case they fill the lamp from the oil bottle, place it in the lap under the gut coat, light it, and let it burn awhile. These lamps are often put to the same use in the house when the weather is cold.

The Aleuts always built the fire outside of the house, as the climate is mild. They are also said by early explorers to have done little cooking.

LAMP. Subangular, water-worn beach stone, elliptic in shape, having a natural cavity on the upper surface forming the lamp reservoir. Crusts of charred moss still adhere to the lamp near the lip where the wick was laid, and the lamp shows evidence of long and constant usage. The specimen was taken from a mound. Length, 9 inches; width, 6¼ inches. Aleuts, Illiuliuk, Unalashka Island, Alaska. Collected by W. H. Dall. 14894. Plate 22, fig. 1.

LAMP. Natural shell of volcanic rock, which, from its shape, has been found suitable for a lamp. Length, 5¼ inches; width, 4⅜ inches. Aleuts, Bay of Islands, Alaska. Collected by W. H. Dall. 13017. Plate 22, fig. 2.

LAMP. Made from volcanic breccia; nearly circular in outline. The reservoir is shallow; the front portion has been broken away. Length, 5⅝ inches; width, 4⅞ inches; height, 2¼ inches. Aleuts, Constantine Harbor, Alaska. Collected by W. H. Dall. 13020.

LAMP. Somewhat water-worn fragment of metamorphic rock, with a natural concavity and slant, which have been taken advantage of by the Aleuts for use as a lamp. The stone is absolutely unmodified, but it serves the purpose as well as though designed by art. The wick edge is irregular, and it must have been possible to lay the wick along a line of about three inches. The edge shows traces of charred moss and the action of fire. This lamp is the most primitive which has come to my knowledge, and it might well begin the entire developmental series of lamps if there were not a question whether or not it is a makeshift. The Aleuts of the peninsula, at least, did work their lamps from stone with some degree of finish. Length, 9¼ inches; width, 6 inches; height at rear, 3 inches. Aleuts, Unalaska, Alaska. Collected by W. H. Dall. 14891. Plate 22, fig. 3.

LAMP. Worked from an oval beach pebble; the reservoir is shallow and oval in outline; there is no definite lip worked out. The bottom of the lamp is irregular; when in use, the lamp must be propped up. Length, 4½ inches; width, 3¾ inches; height, 2 inches. Aleuts, Alaska. Collected by W. H. Dall. 14896. Plate 22, fig. 4.

LAMP. Oblong beach pebble with cavity worked in it. It is probably a toy, if ever designed for a lamp. Length, 3 inches; width, 1⅝ inches. Aleuts, Unalaska, Alaska. Collected by W. H. Dall. 16061. Plate 22, fig. 5.

LAMP. Oval, worked from coarse volcanic breccia. The reservoir is shallow, with the bottom flat. This specimen has seen long use and the remains of charred wick indicate that the lamp was lighted around the entire edge. There is, however, a lip worked out on the edge, as in Kadiak lamps. Length, 6⅝ inches; width, 6½ inches; height at front, 2 inches; at back, 2¾ inches. Aleuts, Alaska. Collected by W. H. Dall. 14897. Plate 20, fig. 4.

LAMP. Oblong-oval lamp excavated in a gray volcanic beach pebble, having a tendency to split into layers. The bottom has cracked off. The reservoir is elliptic in outline and shows markedly the effect of the oil and burning. Length, 6 inches; width, 3½ inches; height, 1½ inches. Aleuts, Alaska. Collected by W. H. Dall. 14899. Plate 23, fig. 1.

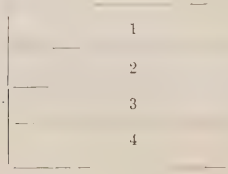
LAMP. Small oval lamp of yellow volcanic rock, having an oval cavity worked out apparently with a sharp-edged tool. There is no defined lip, the wick being applied at the narrower point of the oval. This lamp was taken from a mound or village site. Length, 4¼ inches; width, 3¼ inches; height, 1½ inches. Aleuts, Ulatka, Alaska Peninsula. Collected by W. H. Dall. 14911.

LAMP. Small oval lamp worked from a beach pebble of gray volcanic rock. The cavity has been rudely excavated and is oval in outline. Length, 4 inches; width, 3 inches; height, 1¾ inches. Aleuts, Alaskan Peninsula, Alaska. Collected by W. H. Dall. 14898. Plate 23, fig. 2.

LAMP. Shallow reservoir worked out in the surface of a rounded beach pebble of volcanic rock. The outline of the reservoir is oval and its surface is roughly finished. Length, 5½ inches; width, 4½ inches; height, 2 inches. Aleuts, Alaska. Collected by W. H. Dall. 14900. Plate 23, fig. 3.

LAMP. Made from gray volcanic rock. The reservoir is shallow and semicircular in outline, resembling the Greenland lamp. This is due to the shape of the original beach pebble. There are slight traces of burning on this lamp. Length, 5 inches; width, 3¾ inches; height, 1½ inches. Eskimo, Unalaska, Alaska. Collected by W. H. Dall. 16395. Plate 23, fig. 4.

EXPLANATION OF PLATE 20.



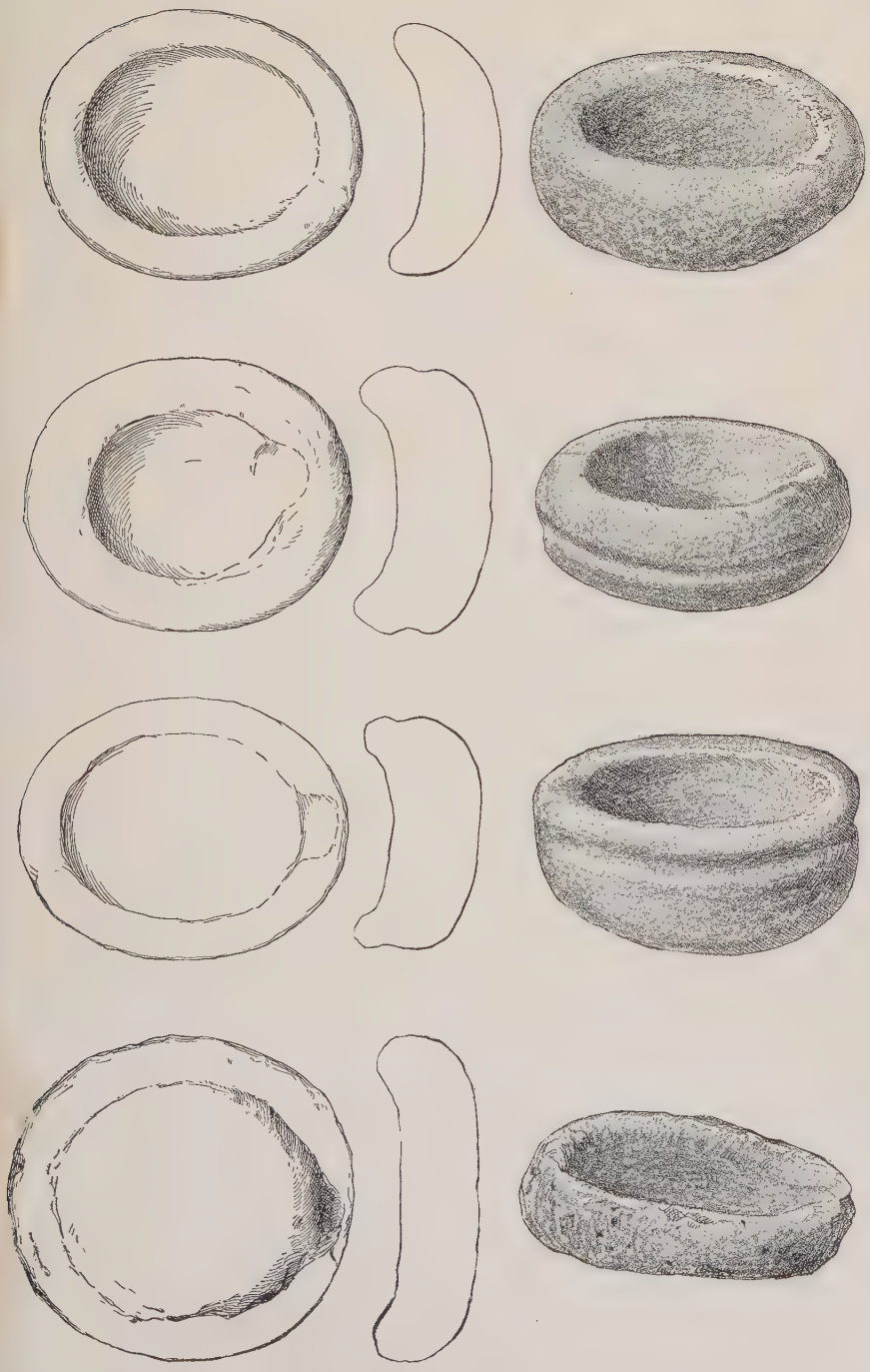
LAMPS OF KADIAK AND THE PENINSULA.

Fig. 1. Stone lamp.
(Cat. No. 90481, U.S.N.M. Kadiak Island. Collected by W. J. Fisher.) (See p. 1055.)

Fig. 2. Stone lamp.
(Cat. No. 140961, U.S.N.M. Oukivok Island. Collected by the U. S. Fish Commission.) (See p. 1057.)

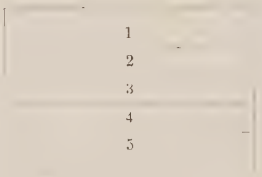
Fig. 3. Stone lamp.
(Cat. No. 56024, U.S.N.M. Southern shore of Bristol Bay. (Alaskan Peninsula.) Collected by C. L. McKay.) (See p. 1054.)

Fig. 4. Stone lamp.
(Cat. No. 14897, U.S.N.M. Alaskan Peninsula. Collected by Dr. W. H. Dall. (See p. 1056.)



LAMPS OF KADIAK AND THE PENINSULA.

EXPLANATION OF PLATE 21.



LAMPS OF KADIAK ISLAND.

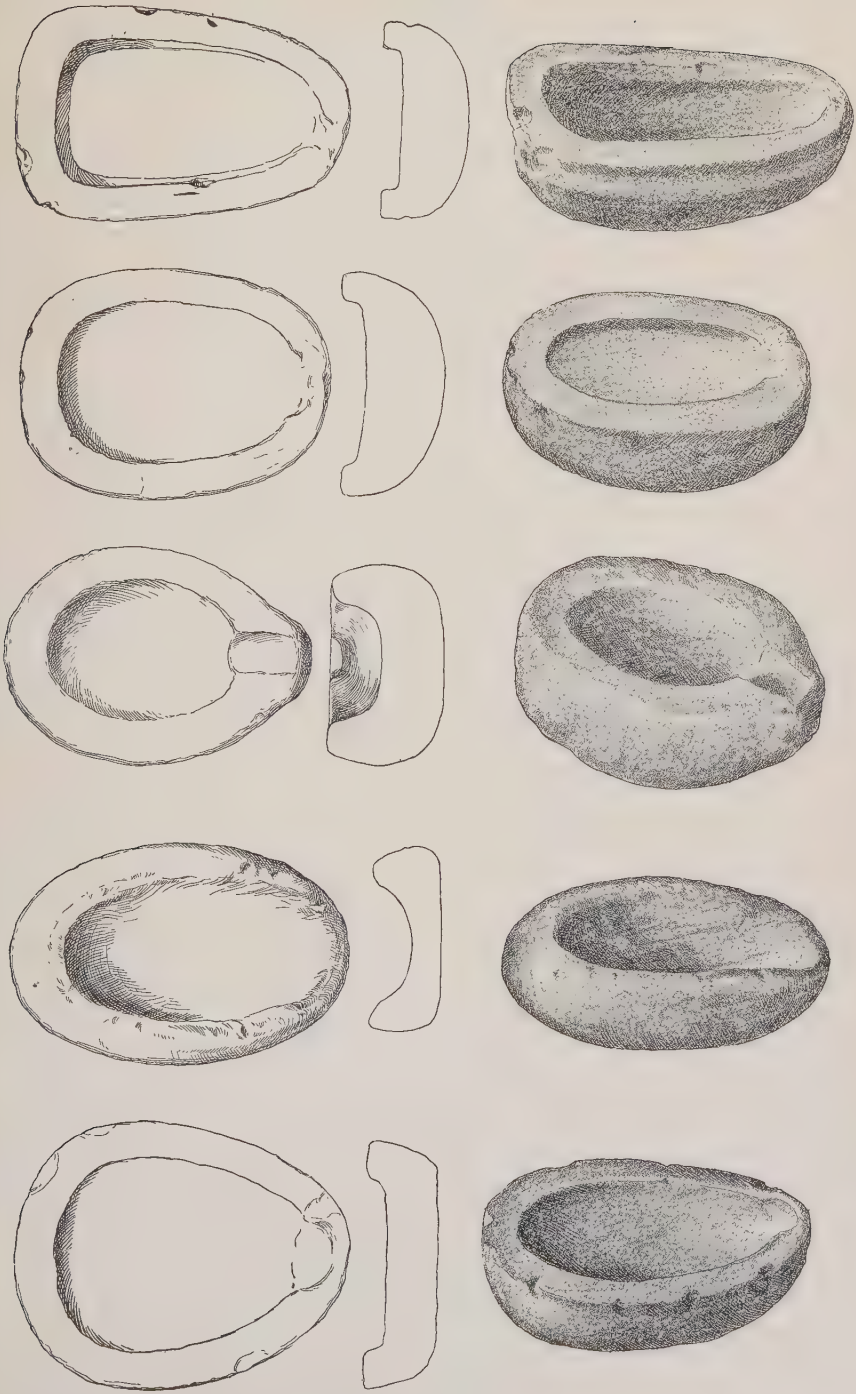
Fig. 1. Stone lamp.
(Cat. No. 42321, U.S.N.M. Collected by Commander L. A. Beardslee, U. S. N.)

Fig. 2. Stone lamp.
(Cat. No. 74724, U.S.N.M. Collected by W. J. Fisher.)

Fig. 3. Stone lamp.
(Cat. No. 131237, U.S.N.M. Collected by Dr. Tarleton H. Bean.)

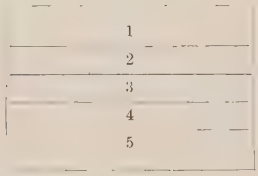
Fig. 4. Stone lamp.
(Cat. No. 90483, U.S.N.M. Collected by W. J. Fisher.)

Fig. 5. Stone lamp.
(Cat. No. 90476, U.S.N.M. Alaskan Peninsula, opposite Kadiak. Collected by W. J. Fisher.)



LAMPS OF KADIAK.

EXPLANATION OF PLATE 22.



LAMPS OF THE ALEUTIAN ISLANDS.

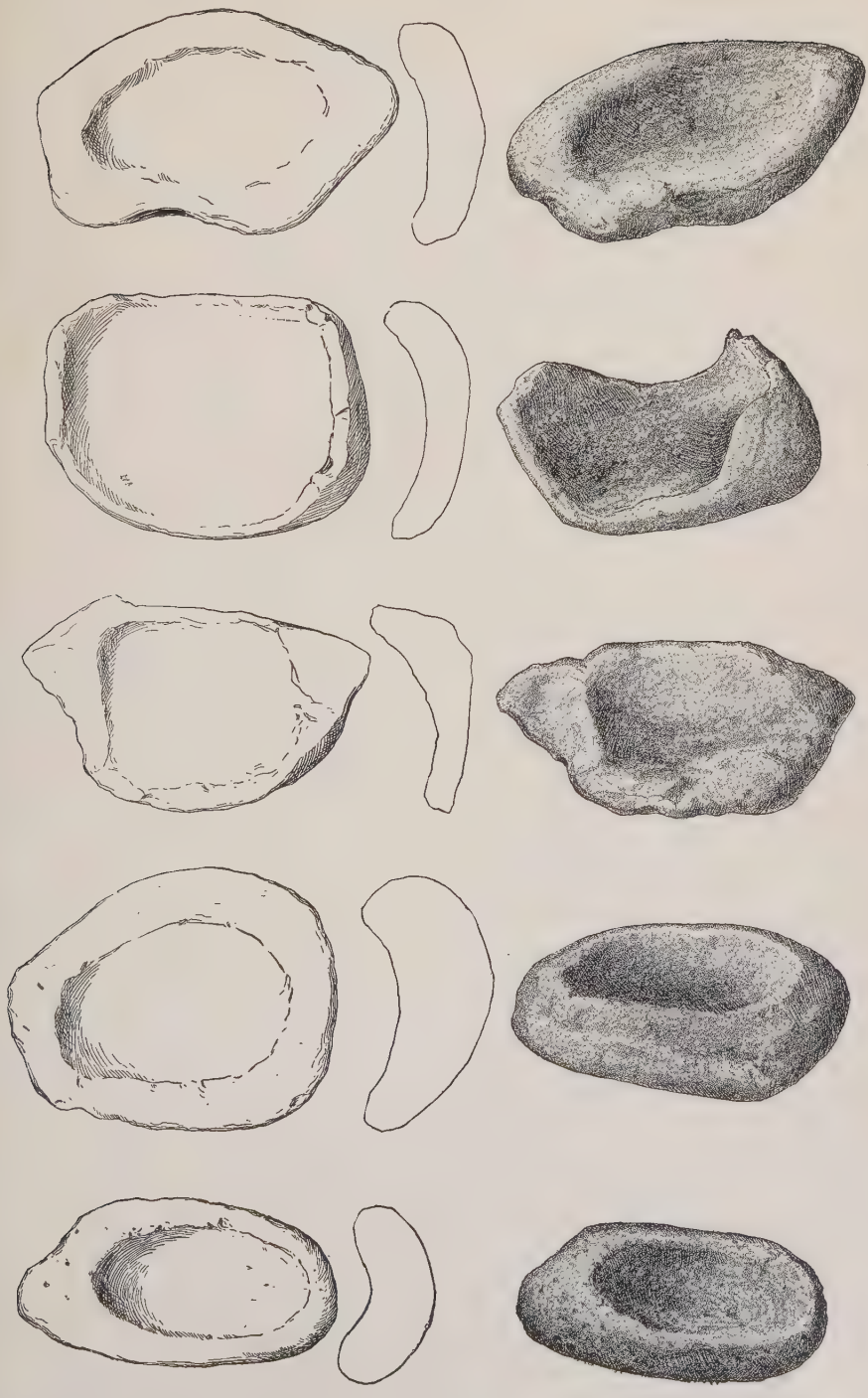
Fig. 1. Rude lamp.
(Cat. No. 14894, U.S.N.M. Unalaska Island. Collected by W. H. Dall.)

Fig. 2. Rude lamp.
(Cat. No. 13017, U.S.N.M. Bay of Islands. Same collector.)

Fig. 3. Rude lamp.
(Cat. No. 14891, U.S.N.M. Unalaska Island. Same collector.)

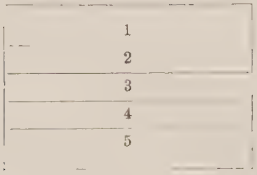
Fig. 4. Rude lamp.
(Cat. No. 14896, U.S.N.M. Aleuts. Same collector.)

Fig. 5. Rude lamp.
(Cat. No. 16061, U.S.N.M. Unalaska. Same collector.)



LAMPS OF THE ALEUTIAN ISLANDS.

EXPLANATION OF PLATE 23.



LAMPS OF THE ALEUTIAN ISLANDS.

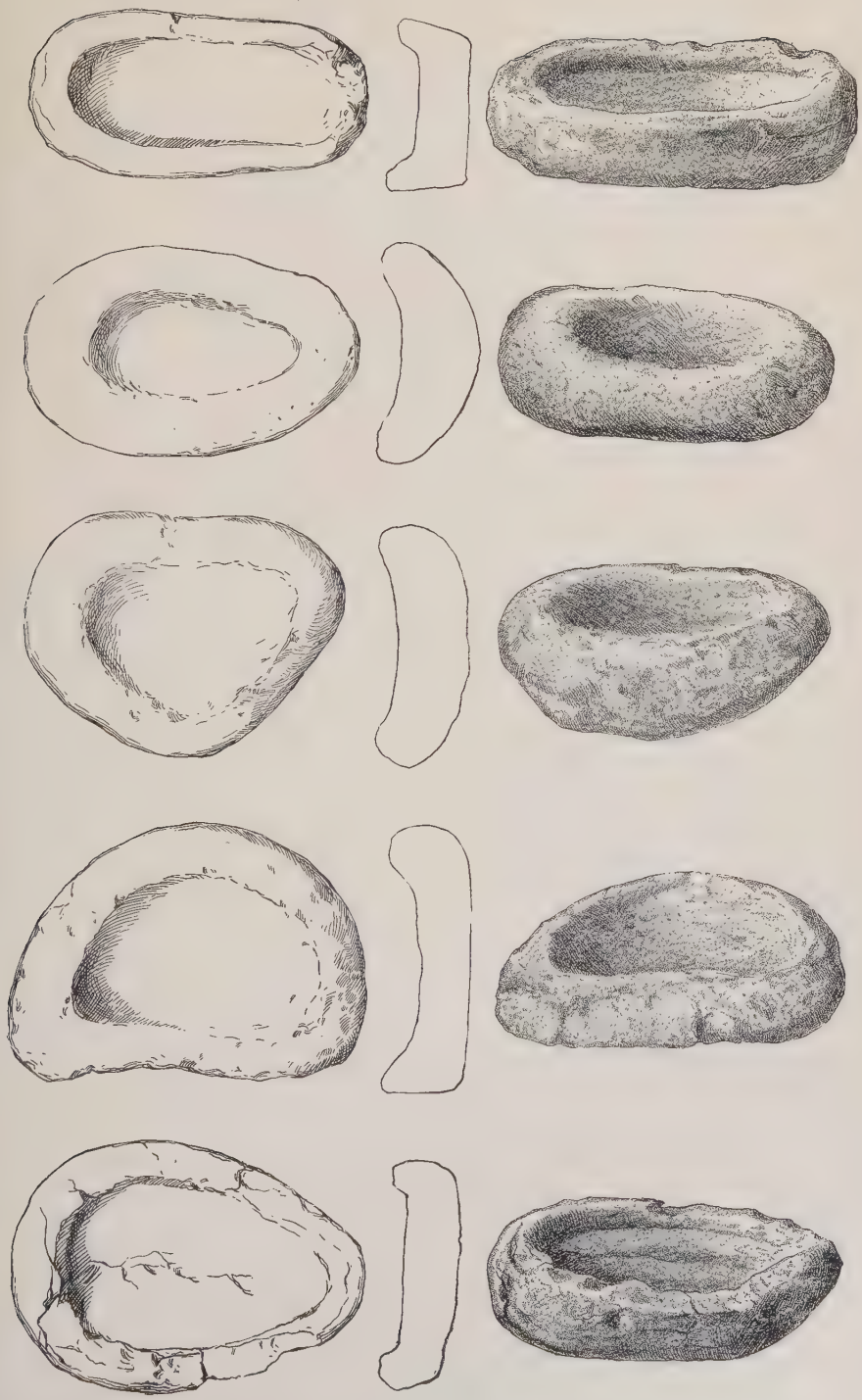
Fig. 1. Rude stone lamp.
(Cat. No. 14899, U.S.N.M. Aleuts. Collected by W. H. Dall.)

Fig. 2. Rude lamp.
(Cat. No. 14898, U.S.N.M. Aleuts. Same collector.)

Fig. 3. Rude lamp.
(Cat. No. 14900, U.S.N.M. Aleuts. Same collector.)

Fig. 4. Rude lamp.
(Cat. No. 16395, U.S.N.M. Unalaska Island. Same collector.)

Fig. 5. Rude lamp.
(Cat. No. 16396, U.S.N.M. Unalaska Island. Same collector.)



LAMPS OF THE ALEUTIAN ISLANDS.

EXPLANATION OF PLATE 24.

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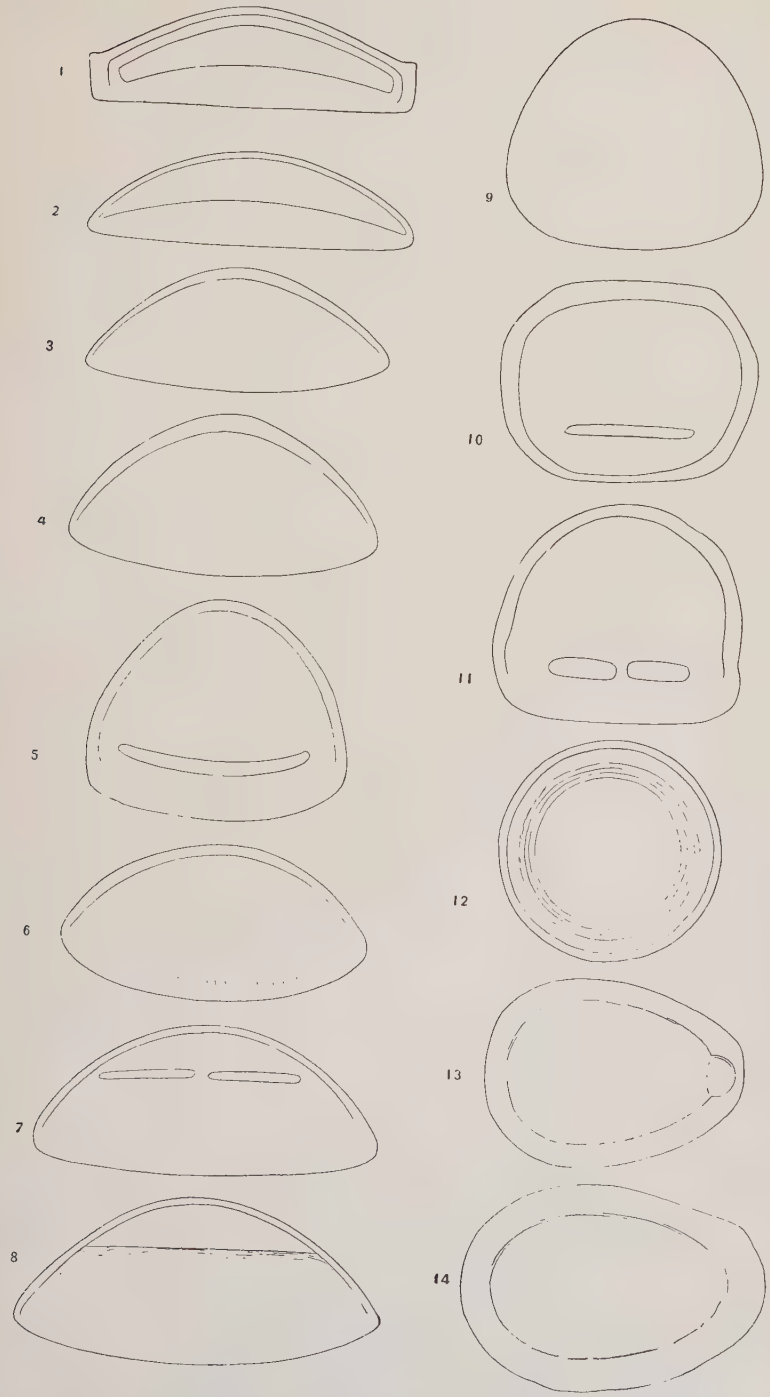
TYPICAL OUTLINES OF ESKIMO LAMPS.

1, Labrador; 2, Cumberland Gulf; 3, Smith Sound; 4, Repulse Bay; 5, North Greenland; 6, East Greenland; 7, Mackenzie River; 8, Point Barrow; 9, Kotzebue Sound; 10, St. Lawrence Island; 11, Eastern Siberia; 12, Bristol Bay; 13, Kadiak, and 14, Aleutian Islands.



TYPICAL OUTLINES OF ESKIMO LAMPS.

LAMP. Oval lamp of stone, the wick lip being at the narrower point. This lamp has seen constant use, the stone having spalled off from heat. Length, $6\frac{1}{4}$ inches; width, $4\frac{3}{4}$ inches; height, $1\frac{3}{4}$ inches. Eskimo, Unalaska, Alaska. Collected by W. H. Dall. 16369. Plate 23, fig. 5.

LAMP. Small circular lamp smoothly worked from stone; this has a groove worked around the outside and a lip is worked in the edge; the reservoir is cup-shaped. Apparently at times the wick has been installed around the edge, probably to secure a greater light than the width of the wick edge or lip would admit. While identical in form with the lamps from Bristol Bay the lip cut in the edge relates it to the Kadiak region. Length, $4\frac{1}{8}$ inches; width, $4\frac{1}{2}$ inches; height, $2\frac{1}{4}$ inches. Aleuts, Onkivok Island, Alaska. Collected by United States Fish Commission. 140961. Plate 20, fig. 2.

LAMP. Suboval, with rounded bottom, vertical sides, and rounded edge. The walls of the reservoir are nearly vertical and the bottom nearly flat. A large chip has been knocked off the edge, apparently with design, in order to place a moss wick, the remains of which are found on the broken surface. This lamp seems to be a connecting type between those of Kadiak and the pottery lamps of Bristol Bay. It was taken from a burial place. Length, $4\frac{3}{4}$ inches; width, $4\frac{3}{8}$ inches; height, $2\frac{1}{16}$ inches. Aleuts, Cheranoffsky, Unalaska Island, Alaska. Collected by Marcus Baker. 46203.

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